

**HABIRSHAW  
BUILDING  
WIRES  
AND CABLES**

***PHELPS DODGE *COPPER* PRODUCTS***  
**CORPORATION**

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**HABIRSHAW  
BUILDING WIRES  
AND CABLES**



- HABIRSHAW** • Type R—Code Grade  
Type RL—Lead Sheathed  
Type RF—Fixture Wire
- HABIRSHAW** • Type RH—Heat Resistant  
Type RH-RW—Heat Resistant and Moisture Resistant  
Type RHL—Lead Sheathed
- HABIRSHAW** • Type TW—Flame and Moisture Retardant Thermoplastic  
Type TF—Fixture Wire
- HABIRSHAW** • PD-X Nonmetallic-Sheathed Cable
- HABIRSHAW** • SERVICE DROP CABLE—Type SD
- HABIRSHAW** • SERVICE ENTRANCE CABLE—Type SE—Style U  
Type SE—Style A  
Type USE

**SUPPLEMENTARY LIST OF WIRES AND CABLES**

- HABIRSHAW** • Type RR Rubber Insulated Neoprene Sheathed Cable  
Low Voltage  
High Voltage
- HABIRSHAW** • Varnished Cambric Cable
- HABIRSHAW** • Thermoplastic Machine Tool, Control, and Switchboard Wire
- HABIRSHAW** • Cords  
Types S, SO, SJ and SJO  
Types SP and C

**PHELPS DODGE COPPER PRODUCTS CORPORATION**

**HABIRSHAW CABLE & WIRE DIVISION**







# ***PHELPS DODGE COPPER PRODUCTS***

## **CORPORATION**

General Offices: 40 WALL STREET, NEW YORK 5, N. Y.

Cable Address: AMCOPRO

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**"MINE TO MARKET"**



**HABIRSHAW  
BUILDING WIRES  
AND CABLES**
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Habirshaw Building Wires and Cables are available through  
Phelps Dodge Copper Products Corporation Distributors

# Foreword



**In the early** eighteen eighties, Dr. William Habirshaw, an eminent chemist, foresaw the importance of providing safe and efficient conductors of electricity for the young and growing electrical industry. In 1886 he organized the Triplex Company for the manufacture of insulated wire. This later became The India Rubber & Gutta Percha Insulating Company, and afterwards, The Habirshaw Wire Company. The company was an important producer during the first World War, and during succeeding years continued to grow in volume and variety of product.

Later it became a part of the Phelps Dodge Copper Products Corporation, and now operates as the Habirshaw Cable and Wire Division of that company. The Habirshaw Division operates three plants, all located in Yonkers, New York.

Habirshaw is the originator of many types of insulated wires and cables now manufactured by the entire industry. Habirshaw "Flame-Stop" wire was one of the first flame retarding, moisture resisting wires to be introduced and remains an important item of manufacture.

Habirshaw Building Wires are made in the following types:

- R Code rubber
- RH Heat resistant rubber
- RW Moisture resistant rubber
- TW Thermoplastic, flame and moisture resistant
- Nonmetallic-sheathed cable

Habirshaw manufactures a complete line of Service Entrance Cables and was one of the first to develop an unarmored Service Entrance Cable and to secure Underwriters' Laboratories' approval for its use as an integral cable from the pole to the house, down the side of the house, and through the service equipment to the range without the use of conduit or other mechanical protection.

Habirshaw manufactures also Varnished Cambric Cables, Metallic and Nonmetallic-Sheathed Parkway Cables, and Rubber Insulated Cables for



every known application. The company for years has specialized in the design and manufacture of special constructions for unusual or severe application or installation conditions. Other important Habirshaw products are its complete line of high voltage power cables designed for voltages up to 230,000 and for every installation condition. An interesting new product is Styroflex Cable for ultra-high frequency transmission.

Through the years the company has maintained completely equipped research laboratories which conduct an endless search for new and improved materials, products and production methods.

The invaluable experience acquired by this organization through its sixty-odd years of uninterrupted operation affords to its customers complete assurance that wires and cables made by Habirshaw will give lasting satisfaction.




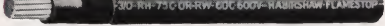








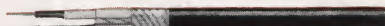



*The Glenwood Mill of the Habirshaw Division at Yonkers, New York*

**HABIRSHAW BUILDING WIRES AND CABLES**




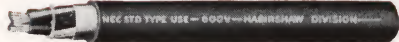





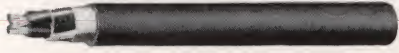






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	<b>R</b>	Flamestop Code	60 C (140 F)	General Use	<b>11</b>
	<b>RF</b>	Flamestop Code	60 C (140 F)	Fixture Wire	<b>12</b>
	<b>RH</b>	Flamestop Heat-Resistant	75 C (167 F)	General Use	<b>11</b>
	<b>RW</b>	Flamestop Moisture-Resistant	60 C (140 F)	General Use and in Wet Locations	<b>11</b>
	<b>RH-RW</b>	Flamestop Heat or Moisture-Resistant RH-RW	75 C (167 F) as RH	General Use as RH	<b>11</b>
			60 C (140 F) as RW	General Use and in Wet Locations as RW	<b>11</b>
	<b>RL</b>	Rubber Lead	60 C (140 F)	Wet Locations and other Special Conditions	<b>13</b>
					
	<b>RHL</b>	Heat Resistant Rubber Lead	75 C (167 F)	Wet Locations and other Special Conditions	<b>13</b>
					
	<b>TW</b>	Habirdure Thermo-plastic Insulated	60 C (140 F)	General Use and in Wet Locations	<b>16</b>
	<b>TF</b>		60 C (140 F)	Fixture Wire	<b>16</b>
	<b>None</b>	Habirdure Machine Tool, Control, and Switchboard Wire	80 C (176 F) in air 60 C (140 F) in oil	Machine Tool, Control and Switch-board Wiring	<b>29</b>
	<b>None</b>	PD-X Nonmetallic-Sheathed Cable	60 C (140 F)	For Wiring Houses, Rural Buildings, Small Stores, and Shops.	<b>17</b>
					



# Wires and Cables

Wires and Cables	Type Letter	Habirshaw Trade Name or Designation	Maximum Operating Temperature	U S E	Page
	SE	Service Entrance Type SE—Style U Unarmored	60 C (140 F)	Service Entrance or Combination Service Drop & Service Entrance	19
	SE	Service Entrance Type SE—Style A Armored	60 C (140 F)	Service Entrance or Combination Service Drop & Service Entrance	20
	SD	Service Drop Type SD	60 C (140 F)	Service Drop	21
 	USE	Service Entrance Type USE	60 C (140 F)	Underground Service Entrance, Direct Burial.	22
	V	Varnished Cambric Braided	85 C (185 F)	Dry locations only. Smaller than No. 6 by special permission.	27
	VL	Varnished Cambric Lead	85 C (185 F)	Wet or Dry locations. Smaller than No. 6 by special permission.	27
  	None	Type RR	75 C (167 F) Low Voltage 85 C (185 F) High Voltage	General Purpose for Direct Burial, Aerial, Conduit and Underground Duct Installations.	23 25
	S or SO	Hard Service Cord	60 C (140 F)	Pendant or portable extra hard usage in damp locations; SO for oil resistance.	30
	SJ or SJO	Junior Hard Service Cord	60 C (140 F)	Pendant or portable hard usage in damp locations; SJO for oil resistance.	30
	SP (Formerly POSJ)	All Rubber Parallel Cord	60 C (140 F)	For use in pendant or portable applications in damp locations not subject to hard usage	30
	C	Lamp Cord	60 C (140 F)	For pendant or portable applications in dry places not subject to hard usage	30

# Habirshaw Insulations

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## ★ TYPE R — CODE GRADE

Although designed primarily to meet the minimum requirements of the National Electrical Code, Habirshaw Code Grade Rubber Compound possesses superior electrical, mechanical and aging properties. Its quality and uniformity are carefully controlled by rigid inspection. It is recommended for general service usage where the maximum operating temperature does not exceed 60 C (140 F). It is not suitable for service in wet locations.

## ★ TYPES RH AND RW — HEAT AND MOISTURE RESISTANT

Habirshaw Heat and Moisture Resistant Grade Compound represents the most modern development in long-lived age-resistant compounds.

It shows remarkable results in both Oxygen Bomb and Geer Oven aging tests, and has been approved by the Underwriters' Laboratories for operation at 75 C copper temperature in dry locations.

In addition it is a moisture resistant insulation which provides economical and dependable wiring for wet locations and has been thoroughly tested and approved by the Underwriters' Laboratories for operation at 60 C copper temperature under these conditions.

This insulation is supplied as dual-purpose Type RH-RW.

## ★ HABIRDUCT

A moisture and heat-resisting rubber-insulating compound conforming to the requirements of the Underwriters' Laboratories for Type RW and Type RH insulations and to the requirements of ASTM Specifications D-754 and D-755. It is our recommended insulation for Submarine Cable and for secondary Network Cable and other low voltage constructions for installations requiring a heat and moisture-resisting grade of insulation.

Habirduct cable is furnished with any of the standard coverings such as lead sheath, neoprene sheath, cotton braid, asbestos braid, etc. Habirduct has proved satisfactory for operation up to 75 C conductor temperature.



★ **HABIRITE**

Habirite is a butyl rubber insulating compound especially suited to high voltage applications because of its remarkable resistance to ozone and superior electrical characteristics. In addition it is tough and resistant to mechanical damage. It is also highly resistant to oxidation and the effects of heat and is suitable for use at copper temperatures up to 85 C (185 F). It more than meets the requirements of A.S.T.M. Specification D-754.

★ **HABIRPRENE**

Habirprene is our trade name for neoprene compounds used as wire and cable coverings. Habirprene jacket provides a tough abrasion resistant covering for many types of cables. It is not affected by weather or sunlight and can be used in locations where exposed to oil, acids and alkalis. For jacketing cables rated at more than 2000 volts, Habirprene is especially compounded for high resistance to corona.

★ **OTHER COMPOUNDS**

In addition to the above, rubber compounds can be furnished for special service conditions.

The Habirshaw Cable and Wire Division, Phelps Dodge Copper Products Corporation, is in a position, with its well-equipped research laboratories and technical staff, to give expert advice on all special problems.

★ **HABIRSHAW-THERMOPLASTIC INSULATED**

Habirshaw Habirdure wires and cables are insulated with a plasticized synthetic resin which is non-inflammable, highly resistant to oils and corrosive chemicals. It is mechanically tough and requires no outer protective covering. Electrically it has exceptionally high dielectric strength and is highly corona-resistant. Habirdure insulation is practically non-aging as it does not oxidize. It is made in a wide variety of fadeless colors. The clean, smooth, tough finish of Habirdure wire makes it easy to install.



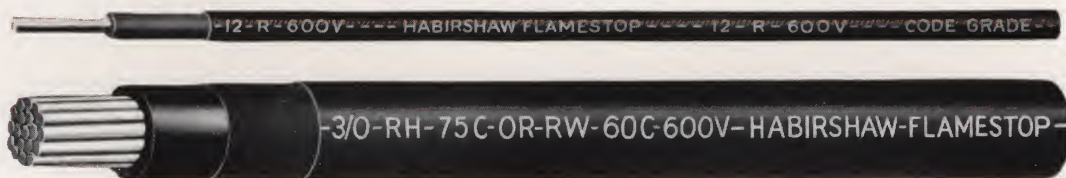
*Building Wires  
and Cables*

HABIRSHAW • PROVEN BY THE TEST OF TIME





## Types R, RH, RW and RH-RW — Single Conductor — Fibrous Covered



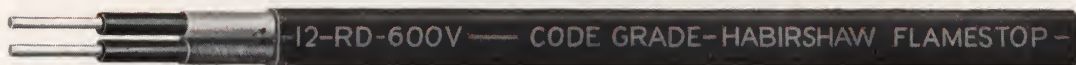
0 to 600 Volts

Approved by Underwriters' Laboratories

RH Wire except for sizes 14 and 12 AWG and all RW Wire is approved and labeled as dual purpose RH-RW

Size AWG or C.M.	Stranding	Thickness of Insulation		Overall Diameter		Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Package		Net Weight per 1000'	
		R & RH (Inches)	RH-RW (Inches)	R & RH (Inches)	RH-RW (Inches)			R & RH (Pounds)	RH-RW (Pounds)	R & RH (Pounds)	RH-RW (Pounds)
Single Fibrous Covered											
14	solid	2/64	3/64	.15	.18	500	Carton	12	14	22	27
	7/.0242	2/64	3/64	.16	.19	500	Carton	13	15	24	28
12	solid	2/64	3/64	.17	.20	500	Carton	17	19	31	36
	7/.0305	2/64	3/64	.18	.21	500	Carton	18	21	34	39
10	solid		3/64		.22	500	Wrapped Coil		27		51
	7/.0385		3/64		.24	500	Wrapped Coil		29		56
8	solid		4/64		.29	500	Wrapped Coil		44		84
	7/.0486		4/64		.31	500	Wrapped Coil		47		90
Double Fibrous Covered											
14	solid	2/64	3/64	.17	.20	500	Carton	13	16	24	29
	7/.0242	2/64	3/64	.18	.21	500	Carton	15	17	27	31
12	solid	2/64	3/64	.19	.22	500	Carton	17	20	32	38
	7/.0305	2/64	3/64	.20	.23	500	Carton	19	22	36	41
10	solid		3/64		.24	500	Wrapped Coil		27		51
	7/.0385		3/64		.26	500	Wrapped Coil		29		56
8	solid		4/64		.31	500	Wrapped Coil		44		83
	7/.0486		4/64		.33	500	Wrapped Coil		47		90
6	solid		4/64		.34	500	Wrapped Coil		64		123
	7/.0612		4/64		.37	500	Wrapped Coil		69		133
4	7/.0772		4/64		.42	500	Wrapped Coil		99		193
2	7/.0974		4/64		.48	500	Wrapped Coil		140		276
1	19/.0664		5/64		.55	1000	Reel—30"		428		368
1/0	19/.0745		5/64		.59	1000	Reel—30"		508		448
2/0	19/.0837		5/64		.64	1000	Reel—36"		653		543
3/0	19/.0940		5/64		.69	1000	Reel—36"		778		668
4/0	19/.1055		5/64		.75	1000	Reel—36"		931		821
250,000	37/.0822		6/64		.86	1000	Reel—42"		1278		983
300,000	37/.0900		6/64		.93	1000	Reel—42"		1469		1174
350,000	37/.0973		6/64		.98	1000	Reel—42"		1634		1339
400,000	37/.1040		6/64		1.03	1000	Reel—42"		1804		1509
500,000	37/.1162		6/64		1.11	1000	Reel—42"		2147		1852
600,000	61/.0992		7/64		1.23	500	Reel—42"		1408		2226
700,000	61/.1071		7/64		1.30	500	Reel—42"		1579		2567
750,000	61/.1109		7/64		1.33	500	Reel—42"		1666		2742
800,000	61/.1145		7/64		1.36	500	Reel—42"		1747		2904
900,000	61/.1215		7/64		1.43	500	Reel—42"		1917		3244
1,000,000	61/.1280		7/64		1.48	500	Reel—42"		2083		3575
1,250,000	91/.1172		8/64		1.65	500	Reel—48"		2580		4481
1,500,000	91/.1284		8/64		1.78	500	Reel—48"		3004		5327
1,750,000	127/.1174		8/64		1.87	500	Reel—60"		3645		6149
2,000,000	127/.1255		8/64		1.98	500	Reel—60"		4061		6982

## Types RD, RHD and RWD—Two Conductor—Fibrous Covered



0 to 600 Volts

Approved by Underwriters' Laboratories

Size AWG or C.M.	Stranding	Thickness of Insulation		Overall Diameter		Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Package		Net Weight per 1000'	
		RD & RHD	RWD	RD & RHD	RWD			RD & RHD	RWD	RD & RHD	RWD
		(Inches)		(Inches)				(Pounds)		(Pounds)	
14	solid	2/64	3/64	.35 x .20	.41 x .23	500	Wrapped Coil	26	31	50	60
	7/.0242	2/64	3/64	.37 x .21	.43 x .24	500	Wrapped Coil	28	32	53	62
12	solid	2/64	3/64	.39 x .22	.45 x .25	500	Wrapped Coil	35	40	68	78
	7/.0305	2/64	3/64	.41 x .23	.47 x .26	500	Wrapped Coil	37	43	72	84
10	solid	3/64		.49 x .27		500	Wrapped Coil	58		114	
	7/.0385	3/64		.52 x .28		500	Wrapped Coil	62		124	
8	solid	4/64		.60 x .32		500	Wrapped Coil	87		174	
	7/.0486	4/64		.64 x .33		500	Wrapped Coil	93		186	
6	solid*	4/64		.68 x .36		1000	Reel—30"	313		253	
	7/.0612	4/64		.72 x .38		1000	Reel—30"	323		263	

\* Not approved by Underwriters

## Type RF Fixture Wire



0 to 600 Volts

Approved by Underwriters' Laboratories

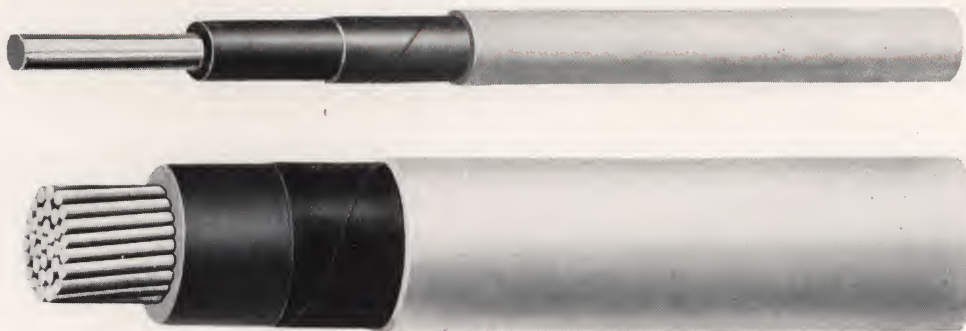
Code grade insulation with fibrous covering saturated and finished with moisture resistant compound.

Size AWG	Underwriters' Designation	Stranding	Thickness of Insulation (Inches)	Overall Diam. (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
18*	RF-1	solid	1/64	.101	1000	Carton	10	9.5
18	RF-2	solid	2/64	.133	1000	Carton	14	13
16	RF-2	solid	2/64	.144	1000	Carton	18	17
18*	RF-1	7/.0152	1/64	.107	1000	Carton	11	10
18	RF-2	7/.0152	2/64	.139	1000	Carton	15	14
16	RF-2	7/.0192	2/64	.151	1000	Carton	19	18

\* 300 volt service



## Types RL and RHL—Single Conductor—Lead Sheathed



0 to 600 Volts

Approved by Underwriters' Laboratories

Size AWG or C.M.	Stranding	Thickness of Insulation (Inches)	Thickness of Lead (Inches)	Overall Diam. (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
14	solid	2/64	2/64	.21	1000	24" Reel	158	108
	7/.0242	2/64	2/64	.22	1000	24" Reel	164	114
12	solid	2/64	2/64	.23	1000	24" Reel	175	125
	7/.0305	2/64	2/64	.24	1000	24" Reel	183	133
10	solid	3/64	3/64	.31	1000	24" Reel	290	240
	7/.0385	3/64	3/64	.34	1000	24" Reel	322	272
8	solid	4/64	3/64	.37	1000	30" Reel	393	318
	7/.0486	4/64	3/64	.40	1000	30" Reel	420	345
6	*solid	4/64	4/64	.44	1000	30" Reel	553	478
	7/.0612	4/64	4/64	.46	1000	30" Reel	592	517
4	7/.0772	4/64	4/64	.50	1000	36" Reel	740	607
2	7/.0974	4/64	4/64	.56	1000	36" Reel	888	755
1	19/.0664	5/64	4/64	.64	1000	36" Reel	1042	909
1/0	19/.0745	5/64	4/64	.68	1000	36" Reel	1161	1028
2/0	19/.0837	5/64	4/64	.73	1000	36" Reel	1300	1168
3/0	19/.0940	5/64	4/64	.78	1000	36" Reel	1478	1345
4/0	19/.1055	5/64	4/64	.84	1000	42" Reel	1978	1553
250,000	37/.0822	6/64	5/64	.98	1000	42" Reel	2444	2019
300,000	37/.0900	6/64	5/64	1.00	1000	42" Reel	2672	2247
350,000	37/.0973	6/64	5/64	1.06	1000	42" Reel	2906	2481
400,000	37/.1040	6/64	5/64	1.10	1000	48" Reel	3193	2707
500,000	37/.1162	6/64	5/64	1.19	1000	48" Reel	3635	3150
600,000	61/.0992	7/64	6/64	1.33	500	42" Reel	2416	3983
700,000	61/.1071	7/64	6/64	1.40	500	42" Reel	2634	4418
750,000	61/.1109	7/64	6/64	1.44	500	42" Reel	2746	4641
800,000	61/.1145	7/64	6/64	1.47	500	48" Reel	2910	4848
900,000	61/.1215	7/64	6/64	1.53	500	48" Reel	3120	5265
1,000,000	61/.1280	7/64	6/64	1.59	500	48" Reel	3335	5696
1,250,000	91/.1172	8/64	7/64	1.79	500	48" Reel	4111	7248
1,500,000	91/.1284	8/64	7/64	1.91	500	60" Reel	5015	8270
1,750,000	127/.1174	8/64	7/64	2.02	500	60" Reel	5524	9287
2,000,000	127/.1255	8/64	7/64	2.13	500	60" Reel	6020	10281

\* Not approved by Underwriters



## Types RDL and RHDL—Two Conductor—Lead Sheathed

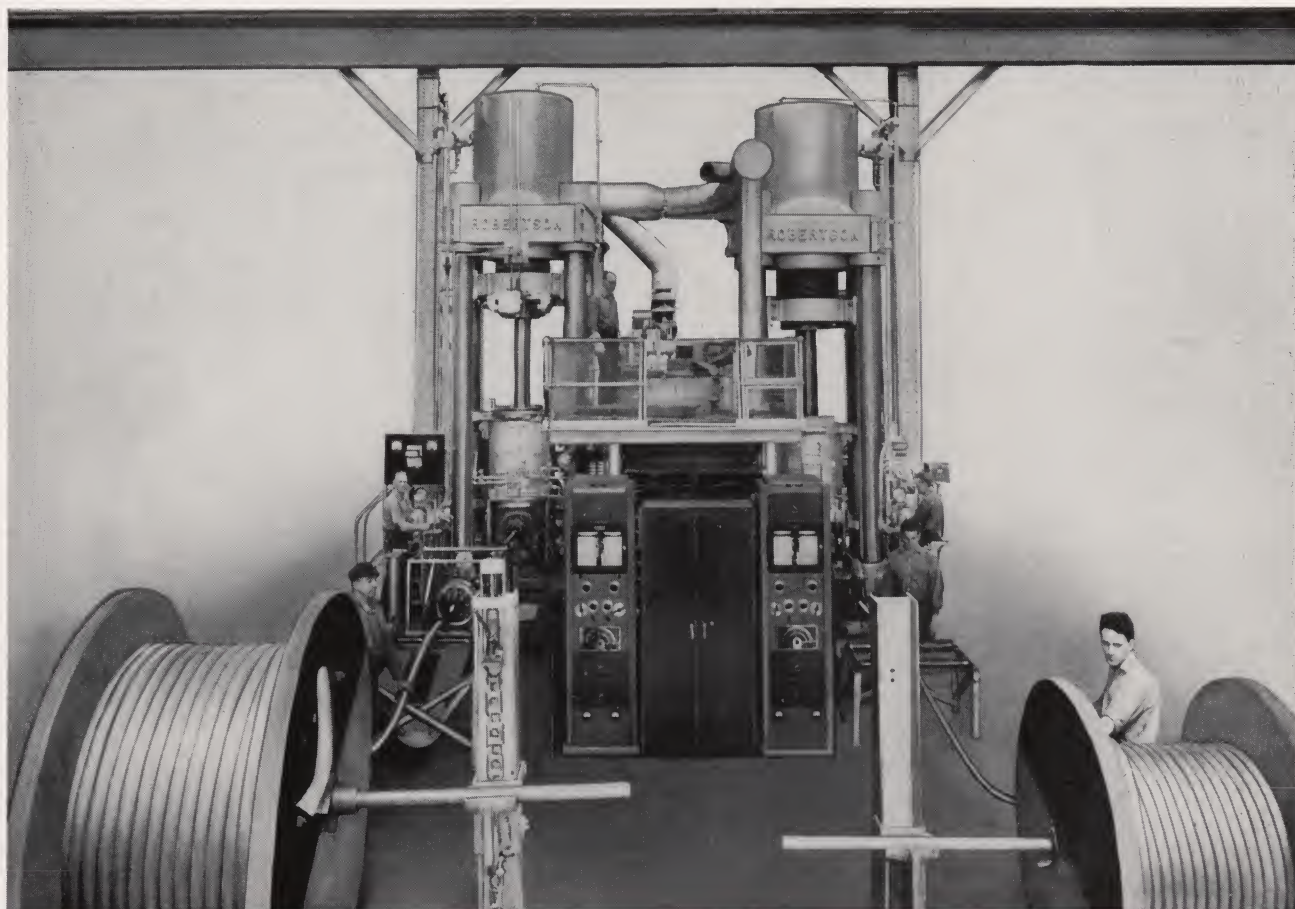


0 to 600 Volts

Approved by Underwriters' Laboratories

Size AWG	Stranding	Thickness of Insulation (Inches)	Thickness of Lead (Inches)	Overall Diam. (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
14	solid	2/64	2/64	.21 x .37	1000	24" Reel	225	175
	7/.0242	2/64	2/64	.22 x .38	1000	24" Reel	232	182
12	solid	2/64	2/64	.23 x .40	1000	24" Reel	256	206
	7/.0305	2/64	2/64	.24 x .42	1000	24" Reel	270	220
10	solid	3/64	3/64	.32 x .54	1000	30" Reel	468	393
	7/.0385	3/64	3/64	.33 x .57	1000	30" Reel	490	415
8	solid	4/64	3/64	.38 x .67	1000	36" Reel	656	526
	7/.0486	4/64	3/64	.40 x .70	1000	36" Reel	680	550
6	solid*	4/64	4/64	.44 x .76	1000	36" Reel	935	805
	7/.0612	4/64	4/64	.47 x .81	1000	36" Reel	974	844
4	7/.0772	4/64	4/64	.52 x .91	1000	42" Reel	1470	1045
2	7/.0974	4/64	4/64	.58 x 1.03	1000	42" Reel	1735	1310
1	19/.0664	5/64	5/64	.67 x 1.19	1000	42" Reel	2285	1860
1/0	19/.0745	5/64	5/64	.72 x 1.27	1000	48" Reel	2606	2120
2/0	19/.0837	5/64	5/64	.76 x 1.36	1000	48" Reel	2881	2395
3/0	19/.0940	5/64	5/64	.81 x 1.47	1000	54" Reel	3510	2730
4/0	19/.1055	5/64	5/64	.87 x 1.58	1000	60" Reel	3800	3120

\* Not approved by Underwriters



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## Types RML and RHML—Three Conductor—Lead Sheathed



0 to 600 Volts

Approved by Underwriters' Laboratories

Size AWG or C.M.	Stranding	Thickness of Insulation (Inches)	Thickness of Lead (Inches)	Overall Diam. (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
14	solid	2/64	3/64	.45	1000	30" Reel	438	363
	7/.0242	2/64	3/64	.47	1000	30" Reel	465	390
12	solid	2/64	3/64	.49	1000	30" Reel	494	419
	7/.0305	2/64	3/64	.54	1000	30" Reel	525	450
10	solid	3/64	4/64	.64	1000	36" Reel	845	715
	7/.0385	3/64	4/64	.67	1000	36" Reel	890	760
8	solid	4/64	4/64	.77	1000	36" Reel	1080	950
	7/.0486	4/64	4/64	.81	1000	36" Reel	1145	1015
6	solid*	4/64	5/64	.87	1000	42" Reel	1880	1455
	7/.0612	4/64	5/64	.92	1000	42" Reel	1945	1520
4	7/.0772	4/64	5/64	1.03	1000	42" Reel	2225	1780
2	7/.0974	4/64	5/64	1.16	1000	48" Reel	2726	2240
1	19/.0664	5/64	6/64	1.33	1000	60" Reel	3860	2980
1/0	19/.0745	5/64	6/64	1.42	1000	60" Reel	4220	3340
2/0	19/.0837	5/64	6/64	1.52	1000	60" Reel	4710	3830
3/0	19/.0940	5/64	6/64	1.63	1000	60" Reel	5250	4370
4/0	19/.1055	5/64	7/64	1.79	1000	60" Reel	6310	5430
250,000	37/.0822	6/64	7/64	1.96	500	60" Reel	4040	6320
300,000	37/.0900	6/64	7/64	2.08	500	60" Reel	4430	7100
350,000	37/.0973	6/64	7/64	2.19	500	60" Reel	4795	7830
400,000	37/.1040	6/64	8/64	2.32	500	60" Reel	5445	9130
500,000	37/.1162	6/64	8/64	2.50	500	66" Reel	6300	10550

\* Not approved by Underwriters

## Type TW—Single Conductor—Thermoplastic



### 0 to 600 Volts

Insulated with Habirdure, a synthetic resin possessing high dielectric strength. Braid covering is not necessary because of the toughness of this insulation. Habirdure is practically non-aging, is highly resistant to moisture, oil, acids and is easy

### Approved by Underwriters' Laboratories

to pull. Omission of braided covering reduces outside diameter to a minimum.

Approved for general purpose wiring and also for use in wet locations at 60 C copper temperature.

Size AWG or C.M.	Stranding	Thickness of Insulation (Inches)	Overall Diam. (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
14	solid	2/64	.13	500	Carton	10	19
	7/.0242	2/64	.14	500	Carton	11	20
12	solid	2/64	.15	500	Carton	15	27
	7/.0305	2/64	.16	500	Carton	16	29
10	solid	2/64	.17	500	Wrapped Coil	21	40
	7/.0385	2/64	.18	500	Wrapped Coil	23	43
8	solid	3/64	.22	500	Wrapped Coil	35	67
	7/.0486	3/64	.24	500	Wrapped Coil	37	72
6	7/.0612	4/64	.31	500	Wrapped Coil	61	117
4	7/.0772	4/64	.36	500	Wrapped Coil	88	172
2	7/.0974	4/64	.42	500	Wrapped Coil	132	259
1	19/.0664	5/64	.49	1000	30" Reel	393	333
1/0	19/.0745	5/64	.53	1000	30" Reel	470	410
2/0	19/.0837	5/64	.58	1000	30" Reel	565	505
3/0	19/.0940	5/64	.63	1000	36" Reel	730	620
4/0	19/.1055	5/64	.69	1000	36" Reel	878	768
250,000	37/.0822	6/64	.76	1000	36" Reel	1028	918
300,000	37/.0900	6/64	.82	1000	36" Reel	1200	1091
350,000	37/.0973	6/64	.87	1000	42" Reel	1550	1255
400,000	37/.1040	6/64	.92	1000	42" Reel	1717	1422
500,000	37/.1162	6/64	1.00	1000	42" Reel	2066	1761
600,000	61/.0992	7/64	1.11	500	42" Reel	1357	2123
700,000	61/.1071	7/64	1.18	500	42" Reel	1518	2446
750,000	61/.1109	7/64	1.22	500	42" Reel	1601	2611
800,000	61/.1145	7/64	1.25	500	42" Reel	1683	2776
900,000	61/.1215	7/64	1.31	500	42" Reel	1848	3106
1,000,000	61/.1280	7/64	1.37	500	42" Reel	2012	3433
1,250,000	91/.1172	8/64	1.54	500	48" Reel	2486	4291
1,500,000	91/.1284	8/64	1.67	500	48" Reel	2894	5107
1,750,000	127/.1174	8/64	1.78	500	48" Reel	3300	5917
2,000,000	127/.1255	8/64	1.88	500	60" Reel	3937	6734

## Type TF Fixture Wire



### 0 to 600 Volts

### Approved by Underwriters' Laboratories

Similar to type TW but approved by Underwriters' Laboratories as Fixture Wire.

Size AWG	Stranding	Thickness of Insulation (Inches)	Overall Diam. (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
18	solid	2/64	.103	1000	Carton	10	9
16	solid	2/64	.114	1000	Carton	14	13
18	7/.0152	2/64	.109	1000	Carton	11	10
16	7/.0192	2/64	.121	1000	Carton	15	14



**PD-X**

*Nonmetallic-  
Sheathed Cable*

HABIRSHAW • PROVEN BY THE TEST OF TIME





## PD-X — Nonmetallic-Sheathed Cable

Inspected and Labeled by the  
Underwriters' Laboratories

Habirshaw PD-X is the fastest, cleanest-working Nonmetallic-Sheathed Cable on the market. PD-X will save you time and money.

The finish is engineered to prevent sticking so that the turns of the coil will separate easily, even after prolonged storage.

The inside of the cable is clean and free from oil, gum and grease. There is no stickiness to hamper stripping.

The paper armor is resin-treated for protection

against moisture and contains no oil nor messy compound. It is applied with a long lay so that a simple twist exposes the insulated conductor.

**Application:** For new and old house wiring, for all circuits beyond entrance where permitted by local code, as in barns, rural buildings, small stores and shops. Also for wiring extension circuits to outlets, for electric ranges, water heaters, etc. This wiring is economical and safe. Only standard fittings are required for installation.

## PD-X — Nonmetallic-Sheathed Cable with Type T Thermoplastic Insulated Conductors

0 to 600 Volts

Approved by Underwriters' Laboratories



With Type T Thermoplastic Insulated Conductors

**Construction:** Annealed copper, solid or stranded, insulated with N.E. Code Type T thermoplastic com-

pound, color coded for polarity identification and a paper armor. Flame and moisture resistant braid overall.

Insulated Conductors		Grounding Conductor		Overall Diameter (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
Size AWG	Stranding	Size AWG	Stranding					
Two Conductor—Without Grounding Conductor								
14	solid			.27 x .49	250	Carton	18	66
12	solid			.28 x .50	250	Carton	22	83
10	solid			.30 x .54	250	Wrapped Coil	30	117
8	7/.0486			.42 x .78	125	Wrapped Coil	24	183
Two Conductor—With Grounding Conductor								
14	solid	16	solid	.27 x .49	250	Carton	19	72
12	solid	14	solid	.28 x .50	250	Carton	25	94
10	solid	12	solid	.30 x .54	250	Wrapped Coil	34	131
8	7/.0486	12	solid	.42 x .78	125	Wrapped Coil	26	201
Three Conductor—Without Grounding Conductor								
14	solid			.51	250	Wrapped Coil	26	100
12	solid			.54	250	Wrapped Coil	33	127
10	solid			.58	250	Wrapped Coil	46	180
8	7/.0486			.83	125	Wrapped Coil	38	294
6	7/.0612			1.01	125	Wrapped Coil	59	464
4	7/.0772			1.11	125	Wrapped Coil	85	667
Three Conductor—With Grounding Conductor								
14	solid	16	solid	.51	250	Wrapped Coil	28	107
12	solid	14	solid	.54	250	Wrapped Coil	37	142
10	solid	12	solid	.58	250	Wrapped Coil	50	197
8	7/.0486	12	solid	.83	125	Wrapped Coil	40	310
6	7/.0612	10	7/.0385	1.01	125	Wrapped Coil	63	496
4	7/.0772	8	7/.0486	1.11	125	Wrapped Coil	91	718

## PD-X — Nonmetallic-Sheathed Cable with Type R Rubber Insulated Conductors

0 to 600 Volts

Approved by Underwriters' Laboratories



With Type R Rubber Insulated Conductors

**Construction:** Annealed copper, solid or stranded, tinned or lead alloy coated, insulated with N.E. Code Type R rubber compound and protected by a fibrous

covering, color coded for polarity identification, and a paper armor. Flame and moisture resistant braid overall.

Size AWG	Insulated Conductors		Grounding Conductor		Overall Diameter (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
	Stranding		Size AWG	Stranding					
Two Conductor—Without Grounding Conductor									
14	solid				.30 x .55	250	Carton	19	72
12	solid				.32 x .57	250	Carton	25	97
10	solid				.38 x .69	250	Wrapped Coil	35	137
8	7/.0486				.49 x .91	125	Wrapped Coil	29	220
Two Conductor—With Grounding Conductor									
14	solid	16	solid		.30 x .55	250	Carton	21	79
12	solid	14	solid		.32 x .57	250	Carton	28	108
10	solid	12	solid		.38 x .69	250	Wrapped Coil	41	157
8	7/.0486	12	solid		.49 x .91	125	Wrapped Coil	31	235
Three Conductor—Without Grounding Conductor									
14	solid				.58	250	Wrapped Coil	32	123
12	solid				.61	250	Wrapped Coil	42	162
10	solid				.75	250	Wrapped Coil	62	245
8	7/.0486				.98	125	Wrapped Coil	51	394
6	7/.0612				1.07	125	Wrapped Coil	70	550
4	7/.0772				1.18	125	Wrapped Coil	90	713
Three Conductor—With Grounding Conductor									
14	solid	16	solid		.58	250	Wrapped Coil	34	130
12	solid	14	solid		.61	250	Wrapped Coil	44	172
10	solid	12	solid		.75	250	Wrapped Coil	67	265
8	7/.0486	12	solid		.98	125	Wrapped Coil	57	445
6	7/.0612	10	7/.0385		1.07	125	Wrapped Coil	74	582
4	7/.0772	8	7/.0486		1.18	125	Wrapped Coil	97	764



# *Service Cables*

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## Service Drop and Entrance Cables — 2 and 3 Conductor

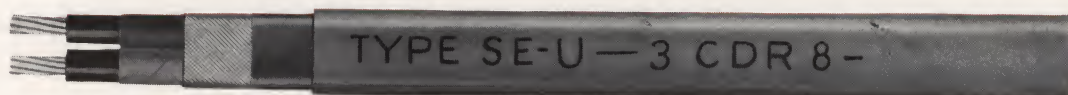
Concentric bare neutral cable may be used economically for many types of installations, such as service drop cable from secondary wires at the pole to point of attachment at building; service entrance cable or combination service drop and service entrance permit-

ting a non-splice connection between service wires at pole and service equipment.

Standard color for Type SD cable is black. Standard color for Type SE—Style U and SE—Style A is neutral gray; however, other colors can be furnished.

### Type SE — Style U — Service Entrance Cable — Unarmored

Underwriters' Type SE



0 to 208 Volts to Ground

Approved by Underwriters' Laboratories

May be installed on exterior and interior of a building without conduit.

Approved by the Underwriters for service directly to the range receptacle; may be used for the entire service or any portion of the wiring between the pole line and the electric range, domestic water heater, or service receptacle.

The use of Type SE—Style U cable reduces the

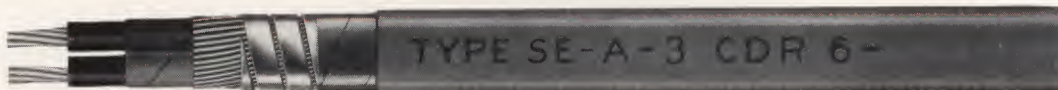
items required for any installation to a minimum and thereby effects savings where used.

Type SE—Style U entrance cables have either one or two rubber insulated inner conductors over which is laid a concentric bare conductor protected by rubberized tape and a substantial weather-proofed cotton braid, finished gray or other suitable color if desired, and forming a smooth, moisture-resistant covering.

Insulated Conductor		Uninsulated Neutral Size AWG	Overall Dimensions (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
Size AWG	Stranding						
Two-Conductor							
12	solid	12	.33	250	Wrapped Coil	19	74
10	solid	10	.35	250	Wrapped Coil	27	103
8	solid	8	.42	250	Wrapped Coil	40	155
8	7/.0486	8	.44	250	Wrapped Coil	42	164
6	7/.0612	8 <sup>o</sup>	.48	250	Wrapped Coil	53	206
6	7/.0612	6	.50	250	Wrapped Coil	60	237
4	7/.0772	6	.55	200	Wrapped Coil	62	305
4	7/.0772	4	.57	200	Wrapped Coil	72	355
2	7/.0974	4	.63	150	Wrapped Coil	70	460
2	7/.0974	2	.65	150	Wrapped Coil	77	505
Three-Conductor							
12	solid	12	.33 x .49	250	Wrapped Coil	33	126
10	solid	10	.35 x .55	250	Wrapped Coil	44	170
8	solid	8	.42 x .66	250	Wrapped Coil	65	254
8	7/.0486	8	.44 x .70	250	Wrapped Coil	68	265
6	7/.0612	8	.48 x .77	200	Wrapped Coil	70	343
6	7/.0612	6	.50 x .79	150	Wrapped Coil	57	374
4	7/.0772	6	.55 x .89	150	Wrapped Coil	76	496
4	7/.0772	4	.57 x .90	150	Wrapped Coil	83	542
2	7/.0974	4	.63 x 1.03	100	Wrapped Coil	77	754
2	7/.0974	2	.65 x 1.05	100	Wrapped Coil	85	832

## Type SE — Style A — Service Entrance Cable — Armored

Underwriters' Type SE



0 to 208 Volts to Ground

Approved by Underwriters' Laboratories

Armored service entrance cable for use without conduit. Similar in construction to Type SE—Style U except for a flat steel armor tape applied directly over the bare neutral. Approved for the same service as

Type SE—Style U without exception. Type SE—Style A cable is generally used on the exterior of a building where it may be subject to mechanical injury.

Size AWG	Insulated Conductors  Stranding	Uninsulated Neutral Size AWG	Overall Dimensions (Inches)	Shipping Length (Feet)	Type of Package	Shipping Weight Per Std. Pkg. (Pounds)	Net Weight per 1000' (Pounds)
<b>Two-Conductor</b>							
12	solid	12	.35	250	Wrapped Coil	29	112
10	solid	10	.38	250	Wrapped Coil	33	126
8	solid	8	.43	250	Wrapped Coil	51	197
8	7/.0486	8	.46	250	Wrapped Coil	53	205
6	7/.0612	8	.50	250	Wrapped Coil	68	267
6	7/.0612	6	.52	250	Wrapped Coil	76	300
4	7/.0772	6	.57	200	Wrapped Coil	73	360
4	7/.0772	4	.59	200	Wrapped Coil	82	405
2	7/.0974	4	.65	150	Wrapped Coil	79	520
2	7/.0974	2	.67	150	Wrapped Coil	94	615
<b>Three-Conductor</b>							
12	solid	12	.35 x .51	250	Wrapped Coil	46	180
10	solid	10	.38 x .57	250	Wrapped Coil	58	225
8	solid	8	.43 x .68	250	Wrapped Coil	75	294
8	7/.0486	8	.46 x .72	250	Wrapped Coil	79	310
6	7/.0612	8	.50 x .79	200	Wrapped Coil	80	392
6	7/.0612	6	.52 x .81	150	Wrapped Coil	65	424
4	7/.0772	6	.57 x .91	150	Wrapped Coil	85	556
4	7/.0772	4	.59 x .92	150	Wrapped Coil	93	610
2	7/.0974	4	.65 x 1.05	100	Wrapped Coil	84	822
2	7/.0974	2	.67 x 1.07	100	Wrapped Coil	92	905



## Type SD — Service Drop Cable

Underwriters' Type SD



**0 to 208 Volts to Ground**

**Approved by Underwriters' Laboratories**

Primarily a service drop cable for use from secondary wires at the pole to point of attachment at building. May be used also as a service entrance cable if protected by conduit.

Has either one or two rubber insulated inner con-

ductors over which is laid concentric bare conductor protected by paper tape and moisture and flame-resisting braid. In 3-conductor cables, insulated conductors are coded for quick identification.

<i>Insulated Conductor</i>		<i>Uninsulated Neutral</i>	<i>Overall Dimensions</i>	<i>Shipping Length</i>	<i>Type of Package</i>	<i>Shipping Weight</i>	<i>Net Weight</i>
<i>Size AWG</i>	<i>Stranding</i>	<i>Size AWG</i>	<i>(Inches)</i>	<i>(Feet)</i>		<i>(Pounds)</i>	<i>per 1000' (Pounds)</i>
<b>Two-Conductor</b>							
12	solid	12	.32	1000	24" Reel	122	72
10	solid	10	.34	1000	24" Reel	151	101
8	solid	8	.40	1000	24" Reel	202	152
8	7/.0486	8	.42	1000	24" Reel	210	160
6	7/.0612	8	.46	1000	30" Reel	264	204
6	7/.0612	6	.48	1000	30" Reel	296	236
4	7/.0772	6	.55	1000	30" Reel	362	302
4	7/.0772	4	.57	1000	30" Reel	411	351
2	7/.0974	4	.63	1000	36" Reel	568	458
2	7/.0974	2	.65	1000	36" Reel	613	503
<b>Three-Conductor</b>							
12	solid	12	.35 x .51	1000	30" Reel	185	125
10	solid	10	.36 x .52	1000	30" Reel	230	170
8	solid	8	.43 x .65	1000	30" Reel	312	252
8	7/.0486	8	.45 x .69	1000	36" Reel	372	262
6	7/.0612	8	.50 x .78	1000	36" Reel	450	340
6	7/.0612	6	.51 x .79	1000	36" Reel	490	380
4	7/.0772	6	.55 x .85	1000	36" Reel	600	490
4	7/.0772	4	.57 x .90	1000	36" Reel	646	536
2	7/.0974	4	.63 x 1.01	1000	42" Reel	1042	747
2	7/.0974	2	.66 x 1.04	1000	42" Reel	1120	825

## Type USE—Underground Service Entrance Cable

Rubber Insulated — Neoprene Sheathed



0 to 600 Volts

Approved by Underwriters' Laboratories

Designed for direct underground burial. Tough Habirprene (neoprene) sheath is resistant to mois-

ture, alkalies, acids and abrasion, assuring long service life in underground installations.

Size AWG or M.C.M.	Stranding	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Overall Diam. (Inches)	Standard Package 1000 Feet	Shipping Weight (Pounds)
<b>Single-Conductor</b>						
12*	Solid	3/64	3/64	.280	24" Reel	104
10	Solid	3/64	3/64	.300	24" Reel	121
8	Solid	4/64	3/64	.360	24" Reel	152
6	7	4/64	3/64	.415	24" Reel	202
4	7	4/64	3/64	.465	24" Reel	262
2	7	4/64	3/64	.510	30" Reel	366
1	19	5/64	4/64	.620	36" Reel	515
1/0	19	5/64	4/64	.660	36" Reel	597
2/0	19	5/64	4/64	.700	36" Reel	698
3/0	19	5/64	4/64	.750	36" Reel	823
4/0	19	5/64	4/64	.810	42" Reel	1164
250	37	6/64	5/64	.920	42" Reel	1363
300	37	6/64	5/64	.980	42" Reel	1541
350	37	6/64	5/64	1.030	42" Reel	1719
400	37	6/64	5/64	1.070	48" Reel	1940
500	37	6/64	5/64	1.160	48" Reel	2287
<b>Three-Conductor</b>						
12*	Solid	3/64	6/64	.630	36" Reel	368
10	Solid	3/64	6/64	.675	36" Reel	430
8	Solid	4/64	6/64	.800	36" Reel	572
6	7	4/64	7/64	.970	42" Reel	979
4	7	4/64	7/64	1.080	48" Reel	1258
2	7	4/64	7/64	1.230	48" Reel	1635
1	19	5/64	8/64	1.400	54" Reel	2134
1/0	19	5/64	8/64	1.490	54" Reel	2452
2/0	19	5/64	8/64	1.580	54" Reel	2820
3/0	19	5/64	8/64	1.690	60" Reel	3344
4/0	19	5/64	9/64	1.850	60" Reel	3970

\*Hand drawn copper conductors.

**PHELPS DODGE COPPER PRODUCTS CORPORATION**



*Type RR General  
Purpose Cable*

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## Habirduct-Habirprene — Type RR General Purpose Cable

Rubber Insulated — Neoprene Sheathed

### Low Voltage

For Direct Burial, Aerial, Conduit, or Underground Duct Installations



Single Conductor



Two Conductor



Three Conductor

Designed for use with copper temperatures up to 75 C (167 F) in wet or dry locations. Habirduct insulation is extremely resistant to heat and moisture; meets requirements of A.S.T.M. Specification D-754 (Heat-Resistant Grade) and A.S.T.M. Specification D-755 (Performance Grade). Also meets Underwriters' Laboratories Specifications for Type RH and RW.

Tough Habirprene (neoprene) sheath is resistant to heat, moisture, oil, acids, alkalies and abrasion; meets requirements of A.S.T.M. Specification D-752 (Neoprene Sheath for Heavy Duty Service).

Cables meet the requirements of I.P.C.E.A. Specifications. Available for voltages up to 2,000 volts. Data for other than 600 volt cables will be supplied on request.

### 600 Volts Single Conductor

#### For Direct Burial or Aerial Installations

#### For Conduit or Underground Duct Installations

Size AWG or MCM	Stranding	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Overall Diam. (Inches)	Standard Package 1000 (Feet)	Shipping Weight (Pounds)	Jacket Thickness (Inches)	Overall Diam. (Inches)	Standard Package 1000 (Feet)	Shipping Weight (Pounds)
14	Solid	3/64	3/64	.260	24" Reel	93	1/64	.190	24" Reel	78
14	7	3/64	3/64	.270	24" Reel	95	1/64	.200	24" Reel	80
12	Solid	3/64	3/64	.280	24" Reel	104	1/64	.210	24" Reel	89
12	7	3/64	3/64	.290	24" Reel	106	1/64	.220	24" Reel	91
10	Solid	3/64	3/64	.300	24" Reel	121	1/64	.230	24" Reel	105
10	7	3/64	3/64	.310	24" Reel	123	1/64	.240	24" Reel	107
8	Solid	4/64	3/64	.360	24" Reel	152	1/64	.290	24" Reel	132
8	7	4/64	3/64	.375	24" Reel	159	1/64	.300	24" Reel	138
6	7	4/64	3/64	.415	24" Reel	202	2/64	.370	24" Reel	189
4	7	4/64	3/64	.465	24" Reel	262	2/64	.420	24" Reel	248
2	7	4/64	3/64	.510	30" Reel	366	2/64	.480	30" Reel	350
1	19	5/64	4/64	.620	36" Reel	515	3/64	.580	30" Reel	447
1/0	19	5/64	4/64	.660	36" Reel	597	3/64	.620	36" Reel	576
2/0	19	5/64	4/64	.700	36" Reel	698	3/64	.670	36" Reel	676
3/0	19	5/64	4/64	.750	36" Reel	823	3/64	.720	36" Reel	799
4/0	19	5/64	4/64	.810	42" Reel	1164	3/64	.780	36" Reel	954
250	37	6/64	5/64	.920	42" Reel	1363	4/64	.890	42" Reel	1335
300	37	6/64	5/64	.980	42" Reel	1541	4/64	.940	42" Reel	1511
350	37	6/64	5/64	1.030	42" Reel	1719	4/64	.990	42" Reel	1687
400	37	6/64	5/64	1.070	48" Reel	1940	4/64	1.040	48" Reel	1907
500	37	6/64	5/64	1.160	48" Reel	2287	4/64	1.130	48" Reel	2251
600	61	7/64	6/64	1.310	54" Reel	2826	4/64	1.250	54" Reel	2746
750	61	7/64	6/64	1.410	54" Reel	3366	4/64	1.340	54" Reel	3280
1000	61	7/64	6/64	1.560	54" Reel	4180	4/64	1.500	54" Reel	4082

## Habirduct-Habirprene — Type RR General Purpose Cable

600 Volts (continued)

For Direct Burial, Aerial, Conduit, or Underground Duct Installations

600 Volts		2-Conductor Flat						3-Conductor Round			
Size AWG	Stranding	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Overall Dimensions (Inches)	Standard Package 1000 (Feet)	Shipping Weight (Pounds)		Jacket Thickness (Inches)	Overall Diameter (Inches)	Standard Package 1000 (Feet)	Shipping Weight (Pounds)
14	Solid	3/64	3/64	.280 x .450	24" Reel	140		5/64	.590	30" Reel	277
14	7	3/64	3/64	.295 x .490	24" Reel	148		5/64	.610	30" Reel	289
12	Solid	3/64	3/64	.300 x .500	24" Reel	163		6/64	.630	36" Reel	368
12	7	3/64	3/64	.310 x .520	24" Reel	170		6/64	.650	36" Reel	386
10	Solid	3/64	4/64	.360 x .590	30" Reel	223		6/64	.675	36" Reel	430
10	7	3/64	4/64	.370 x .600	30" Reel	232		6/64	.705	36" Reel	452
8	Solid	4/64	4/64	.410 x .690	30" Reel	296		6/64	.800	36" Reel	572
8	7	4/64	4/64	.430 x .720	30" Reel	310		6/64	.830	36" Reel	603
6	7	4/64	4/64	.470 x .800	36" Reel	443		7/64	.970	42" Reel	979
4	7	4/64						7/64	1.080	48" Reel	1258
2	7	4/64						7/64	1.230	48" Reel	1635
1	19	5/64						8/64	1.400	54" Reel	2134
1/0	19	5/64						8/64	1.490	54" Reel	2452
2/0	19	5/64						8/64	1.580	54" Reel	2820
3/0	19	5/64						8/64	1.690	60" Reel	3344
4/0	19	5/64						9/64	1.850	60" Reel	3970

### Installation Instructions for Type RR Cable Buried in the Ground

Type RR Cable is not armored and requires reasonable care in handling. The following precautions must be taken during installation to insure satisfactory service: 1. Depth of burial should be at least 24 inches for normal runs and at least 36 inches under roads and driveways; 2. Bottom of trench should be free from stones or other foreign objects. Additional safety may be obtained by filling with about two inches of **SIFTED** earth or sand before laying cable; 3. Where more than one cable is to be installed in a trench it is very important to see that cables do not cross one another at any point; 4. First six inches of fill over cable should be **SIFTED** earth or sand. For protection of, and against, future excavations, where likely to occur, concrete slabs or creosoted planks may be laid over this sifted fill. Any wood not creosoted should be kept away from the cable as it may attract destructive termites; 5. Avoid striking cable with or against rocks, tools, or other hard objects.



## Habirite-Habirprene — Type RR General Purpose Cable

### High Voltage



Single Conductor — Shielded



Three Conductor — Shielded

For Direct Burial, Aerial, Conduit, or Underground Duct Installations

Designed for use at copper temperatures up to 85 C (185 F) in wet or dry locations.

Habirite butyl rubber high-voltage insulation is far superior to the old-fashioned oil-base type. It is much tougher and much more resistant to heat and ozone, and has superior electrical properties. It easily meets the requirements of A.S.T.M. Specification D-574 (Ozone-Resistant Cable).

Special high-voltage type Habirprene (neoprene) sheath is not only resistant to heat, moisture, oil, acids, alkalis, and abrasion, but has extra toughness and tear resistance, and is extremely resistant to the effects of corona and ozone. It meets the requirements of A.S.T.M. Specification D-752 (Neoprene Sheath for

Heavy Duty Service).

Shielding, where recommended by I.P.C.E.A., will be supplied as follows:

- A. Conductor Shield: a layer of semi-conducting tape over the conductor and under the insulation.
- B. Insulation Shield: an open concentric serve of #20 AWG coated copper wires over a semi-conducting layer between the insulation and sheath. (Note: a tinned copper tape shield can be supplied on special order.)

Cables meet the requirements of I.P.C.E.A. Specifications.

Available for voltages above 2,000 volts. Data for other than 5,000 volt cables will be supplied on request.

### 5000 Volts — Shielded

		Single Conductor					Two-Conductor			
Size AWG or MCM	Stranding	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Overall Diameter (Inches)	Standard Package 1000'	Shipping Weight (Pounds)	Jacket Thickness (Inches)	Overall Diam. (Inches)	Standard Package 1000'	Shipping Weight (Pounds)
8	7	10/64	4/64	.74	36" Reel	453	8/64	1.60	60" Reel	2080
6	7	10/64	4/64	.77	36" Reel	503	8/64	1.70	60" Reel	2320
4	7	10/64	4/64	.82	36" Reel	575	9/64	1.85	60" Reel	2709
2	7	10/64	5/64	.92	42" Reel	898	9/64	1.92	60" Reel	2937
1	19	10/64	5/64	.95	42" Reel	973	9/64	2.01	66" Reel	3378
1/0	19	10/64	5/64	.99	42" Reel	1064	9/64	2.10	78" Reel	3976
2/0	19	10/64	5/64	1.04	42" Reel	1175	9/64	2.20	78" Reel	4353
3/0	19	10/64	5/64	1.09	48" Reel	1354	9/64	2.32	78" Reel	4837
4/0	19	10/64	5/64	1.15	48" Reel	1522	9/64	2.42	78" Reel	5327
250	37	11/64	6/64	1.26	48" Reel	1780	9/64	2.52	78" Reel	5817
300	37	11/64	6/64	1.32	54" Reel	2108	9/64	2.62	78" Reel	6307
350	37	11/64	6/64	1.37	54" Reel	2300	9/64	2.72	78" Reel	6797
400	37	11/64	6/64	1.42	54" Reel	2477	9/64	2.82	78" Reel	7287
500	37	11/64	6/64	1.50	54" Reel	2844	9/64	2.92	78" Reel	7777
750	61	11/64	6/64	1.69	60" Reel	3815	9/64	3.02	78" Reel	8267
1000	61	11/64	7/64	1.86	60" Reel	4728	9/64	3.12	78" Reel	8757

# Habirite-Habirprene — Type RR General Purpose Cable

## 5,000 Volts (Continued)

### 5000 Volts — Shielded

		Three-Conductor								
Size AWG or MCM	Stranding	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Overall Diameter (Inches)	Standard Package 1000'	Shipping Weight (Pounds)	Jacket Thickness (Inches)	Overall Diameter (Inches)	Standard Package 1000'	Shipping Weight (Pounds)
6	7	10/64	8/64	1.70	60" Reel	2326	....	...	.....	....
4	7	10/64	8/64	1.80	60" Reel	2618	....	...	.....	....
2	7	10/64	9/64	1.97	66" Reel	3278	....	...	.....	....
1	19	10/64	9/64	2.05	66" Reel	3566	....	...	.....	....
1/0	19	10/64	9/64	2.14	78" Reel	4126	....	...	.....	....
2/0	19	10/64	9/64	2.24	78" Reel	4584	....	...	.....	....
3/0	19	10/64	10/64	2.38	78" Reel	5166	....	...	.....	....
4/0	19	10/64	10/64	2.51	84" Reel	6234	....	...	.....	....

### 5000 Volts — Unshielded Single-Conductor

For Direct Burial or Aerial Installations							For Conduit or Underground Duct Installations			
8	19	10/64	4/64	.60	30" Reel	296	2/64	.54	30" Reel	259
6	19	10/64	4/64	.64	30" Reel	334	2/64	.58	30" Reel	295
4	19	10/64	4/64	.69	30" Reel	407	3/64	.66	30" Reel	386
2	19	10/64	4/64	.75	36" Reel	562	3/64	.72	36" Reel	538
1	37	10/64	4/64	.82	36" Reel	650	3/64	.79	36" Reel	625
1/0	37	10/64	5/64	.89	42" Reel	954	3/64	.83	36" Reel	715
2/0	37	10/64	5/64	.94	42" Reel	1064	3/64	.88	42" Reel	1007
3/0	37	10/64	5/64	.99	42" Reel	1200	3/64	.93	42" Reel	1139
4/0	37	10/64	5/64	1.05	42" Reel	1366	4/64	1.02	42" Reel	1334
250	61	11/64	5/64	1.13	48" Reel	1589	4/64	1.10	48" Reel	1554
300	61	11/64	5/64	1.18	48" Reel	1775	4/64	1.15	48" Reel	1740
350	61	11/64	6/64	1.27	48" Reel	2005	4/64	1.21	48" Reel	1928
400	61	11/64	6/64	1.31	54" Reel	2306	4/64	1.25	48" Reel	2085
500	61	11/64	6/64	1.40	54" Reel	2692	4/64	1.34	54" Reel	2606
750	91	11/64	6/64	1.58	60" Reel	3670	4/64	1.55	54" Reel	3482
1000	91	11/64	7/64	1.80	60" Reel	4668	4/64	1.71	60" Reel	4506

### 5000 Volts — Unshielded

#### For Direct Burial, Aerial, Conduit, or Underground Duct Installations

Two-Conductor							Three-Conductor			
6	19	10/64	8/64	1.37	54" Reel	1586	8/64	1.46	54" Reel	1781
4	19	10/64	8/64	1.47	54" Reel	1809	8/64	1.56	60" Reel	2138
2	19	10/64	8/64	1.59	60" Reel	2215	8/64	1.69	60" Reel	2544
1	37	10/64	8/64	1.67	60" Reel	2432	8/64	1.77	60" Reel	2811
1/0	37	10/64	9/64	1.78	60" Reel	2750	9/64	1.89	60" Reel	3209
2/0	37	10/64	9/64	1.87	60" Reel	3063	9/64	1.99	66" Reel	3787
3/0	37	10/64	9/64	1.97	66" Reel	3612	9/64	2.10	78" Reel	4539
4/0	37	10/64	9/64	2.09	78" Reel	4338	9/64	2.23	78" Reel	5148



*Miscellaneous  
Wires and Cables*

HABIRSHAW • PROVEN BY THE TEST OF TIME





## Habirshaw Varnished Cambric Insulated Cable



Varnished cambric insulated cables are used for general power distribution, building wiring, control cables and special applications. Varnished cambric cables are suitable for normal operation at 85 C copper temperature and are frequently used for feeders in place of rubber insulated cables where the higher operating temperature may be advantageous.

Varnished cambric cables are manufactured in accordance with I.P.C.E.A specifications and conform also to the requirements of the Underwriters' Laboratories and the National Electrical Code for cables rated 5000 volts and less.

The insulation consists of high temperature varnished cloth tapes applied helically with a mineral base slipper compound to facilitate bending.

Saturated cotton braid coverings are used for cables to be installed in dry locations and lead coverings are used for moist and wet locations. Other coverings such as Habirprene, Habirdure, and steel tape armor can be furnished for special applications.

Upon receipt of inquiry stating conditions of service and installation our Engineering Department will furnish recommendations.

### Single Conductor Cables and Multiple Conductor Cables With Individually Shielded Conductors

Rated Voltage Phase to Phase Volts	Range of Sizes A.W.G. or MCM	Varnished Cambric Thickness, Mils	
		Neutral Grounded	Neutral Ungrounded
*0-600	14-8	47	47
	7-2	63	63
	1-4/0	78	78
	213-500	94	94
	501-1000	109	109
	Over 1000	125	125
*600-1000	14-2	63	63
	1-4/0	78	78
	213-500	94	94
	501-1000	109	109
	Over 1000	125	125
*1001-2000	12-2	78	78
	1-4/0	94	94
	213-500	94	94
	501-1000	109	109
	Over 1000	125	125
2001-3000 * (Incl. 2500)	10-2	94	94
	1-4/0	94	94
	213-500	109	109
	501-1000	109	109
	Over 1000	125	125
3001-4000	8-4/0	109	109
	213-500	125	125
	501-1000	125	125
	Over 1000	141	141
4001-5000 * (Incl. 4500)	8-4/0	141	141
	213-1000	156	156
	Over 1000	156	156

### Multiple Conductor Cables Without Individually Shielded Conductors

Rated Voltage Phase to Phase Volts	Range of Sizes A.W.G. or MCM	Varnished Cambric Thickness, Mils			
		Neutral Grounded Cond.	Belt	Neutral Ungrounded Cond.	Belt
*0-600	14-8	47	..	47	..
	7-2	63	..	63	..
	1-4/0	78	..	78	..
	213-500	94	..	94	..
	501-1000	94	31	94	31
	Over 1000	109	31	109	31
*601-1000	14-2	63	..	63	..
	1-4/0	78	..	78	..
	213-500	94	..	94	..
	501-1000	94	31	94	31
	Over 1000	109	31	109	31
1001-2000	12-2	78	..	78	..
	1-4/0	94	..	94	..
	213-500	94	..	94	..
	501-1000	94	31	94	31
	Over 1000	109	31	109	31
2001-3000 * (Incl. 2500)	10-2	78	31	78	31
	1-4/0	94	31	94	31
	213-500	94	31	94	31
	501-1000	94	47	94	47
	Over 1000	109	47	109	47
3001-4000	8-4/0	94	47	94	47
	213-500	94	47	94	47
	501-1000	94	63	94	63
	Over 1000	109	63	109	63
4001-5000 * (Incl. 4500)	8-4/0	94	63	94	63
	213-1000	109	63	109	63
	Over 1000	109	78	109	78



### Single Conductor Cables and Multiple Conductor Cables With Individually Shielded Conductors

Rated Voltage Phase to Phase Volts	Range of Sizes A.W.G. or MCM	Varnished Cambric Thickness, Mils	
		Neutral Grounded	Neutral Ungrounded
5001-6000	8-4/0	141	156
	213-1000	156	172
	Over 1000	156	172
6001-7000	8 and Larger	156	172
7001-8000			
* (Incl. 7500)	6 and Larger	172	188
8001-9000	6 and Larger	188	203
9001-10000	6 and Larger	188	234
10001-11000	6 and Larger	203	250
11001-12000	6 and Larger	219	250
12001-13000	6 and Larger	234	281
13001-14000	6 and Larger	234	297
*14001-15000	6 and Larger	250	328
15001-16000	4 and Larger	266	344
16001-17000	4 and Larger	281	359
17001-18000	4 and Larger	297	391
18001-19000	4 and Larger	313	422
19001-20000	2 and Larger	328	438
20001-21000	2 and Larger	344	453
21001-22000	2 and Larger	359	...
*22001-23000	2 and Larger	375	...
23001-24000	2 and Larger	391	...
24001-25000	2 and Larger	406	...
25001-26000	2 and Larger	422	...
26001-27000	2 and Larger	438	...
27001-28000	1 and Larger	453	...

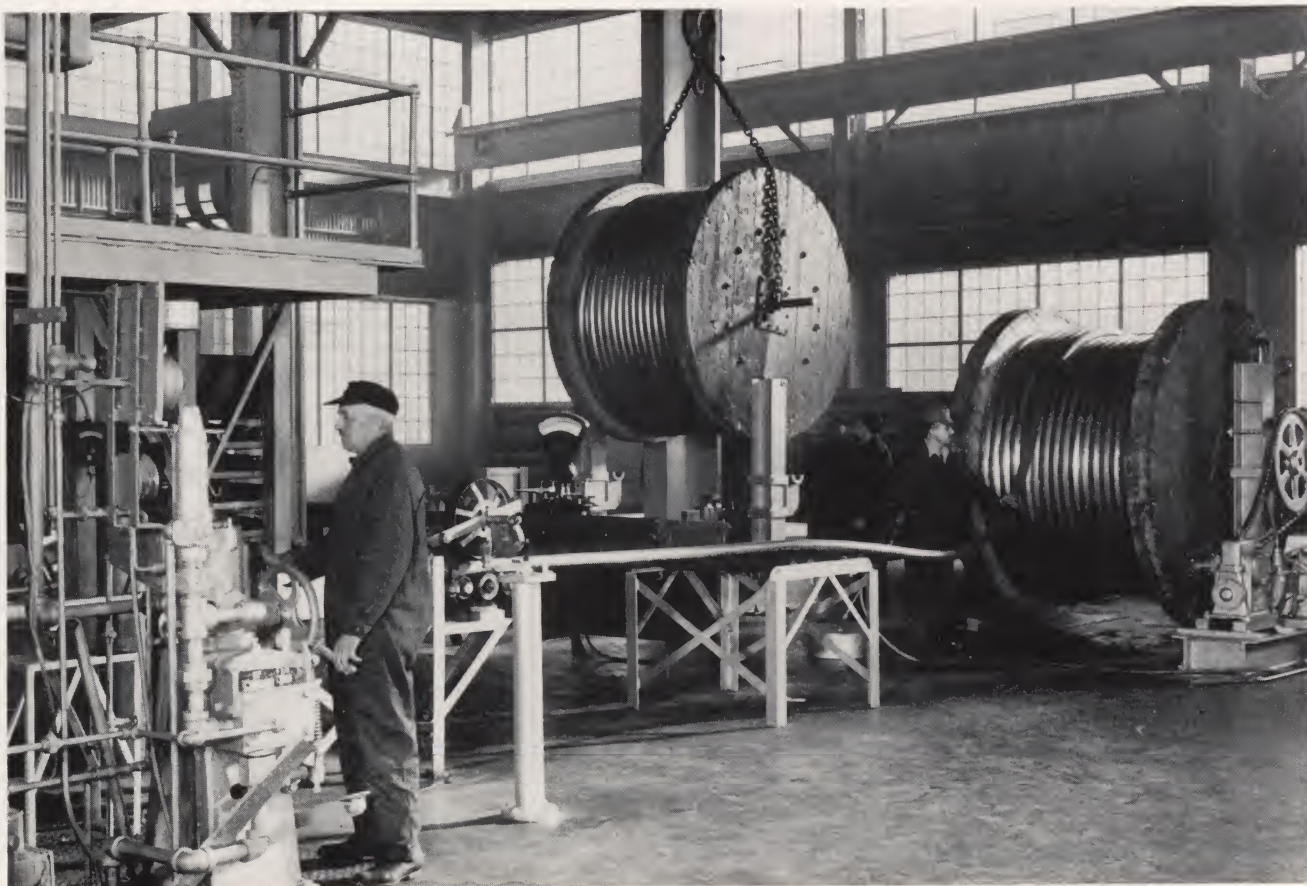
### Multiple Conductor Cables Without Individually Shielded Conductors

Rated Voltage Phase to Phase Volts	Range of Sizes A.W.G. or MCM	Varnished Cambric Thickness, Mils			
		Neutral Grounded Cond.	Neutral Grounded Belt	Neutral Ungrounded Cond.	Neutral Ungrounded Belt
5001-6000	8-4/0	94	78	94	78
	213-1000	109	78	109	78
	Over 1000	109	78	109	78
6001-7000	8 and Larger	109	78	109	94
7001-8000					
* (Incl. 7500)	6 and Larger	109	94	109	109
8001-9000	6 and Larger	125	94	125	125
9001-10000	6 and Larger	141	94	141	141
10001-11000	6 and Larger	156	94	156	156
11001-12000	6 and Larger	156	109	156	156
12001-13000	6 and Larger	172	109	172	172
13001-14000	6 and Larger	188	109	188	188
*14001-15000	6 and Larger	203	109	203	203
15001-16000	4 and Larger	219	109	219	219
16001-17000	4 and Larger	219	109	219	219

\*"Preferred voltage ratings" for general apparatus, recommended by N.E.M.A.-N.E.L.A. Joint Committee on voltage standardizations.

Two-conductor cables will be furnished in round construction unless flat construction is specified on orders.

All cables are in accordance with I.P.C.E.A. and A.S.A. recommendations.





## Habirdure Machine Tool, Control, and Switchboard Wire



**Underwriters' Approved for 60 C in Oil and 80 C Where Exposed to Air  
Meets Requirements of National Machine Tool Builders Association**

Habirshaw Machine Tool Wire is insulated with Habirdure, a synthetic resin which is highly resistant to oils and corrosive chemicals. It meets the requirements of the National Machine

Tool Builders Association and is approved by the Underwriters' Laboratories for use at 80 C copper temperature where exposed to air, or 60 C where exposed to oil, water, or coolants.

<i>Size AWG</i>	<i>Number of Strands</i>	<i>Insulation 64ths (Inches)</i>	<i>Approx. O.D. (Inches)</i>	<i>Approx. Net. Wgt. per 1000' (Pounds)</i>	<i>Standard Package</i>
<b>600 Volts</b>					
18	Solid	2	.10	9	1000 ft. spool
18	7	2	.11	10	1000 ft. spool
18	19	2	.11	10	1000 ft. spool
16	Solid	2	.11	13	1000 ft. spool
16	7	2	.12	14	1000 ft. spool
16	19	2	.12	14	1000 ft. spool
14	Solid	2	.13	19	500 ft. spool
14	7	2	.14	20	500 ft. spool
14	19	2	.14	20	500 ft. spool
12	Solid	2	.15	27	500 ft. spool
12	7	2	.16	29	500 ft. spool
12	19	2	.16	29	500 ft. spool
10	Solid	2	.17	40	500 ft. coil
10	7	2	.18	43	500 ft. coil
10	19	2	.18	43	500 ft. coil
8	Solid	3	.23	65	500 ft. coil
8	7	3	.25	70	500 ft. coil
8	19	3	.25	70	500 ft. coil
6	Solid	4	.29	106	500 ft. coil
6	7	4	.31	113	500 ft. coil
6	19	4	.32	113	500 ft. coil
4	7	4	.36	168	500 ft. coil
4	19	4	.37	168	500 ft. coil
2	7	4	.42	251	500 ft. coil
2	19	4	.43	251	500 ft. coil
1	19	5	.50	324	1000 ft. 36 in. reel
<b>600 Volt Heavy Insulation</b>					
16	Solid	3	.15	17	1000 ft. spool
16	7	3	.15	17	1000 ft. spool
16	19	3	.15	17	1000 ft. spool
14	Solid	3	.16	22	500 ft. spool
14	7	3	.17	24	500 ft. spool
14	19	3	.17	24	500 ft. spool
12	Solid	3	.18	31	500 ft. spool
12	7	3	.19	33	500 ft. spool
12	19	3	.19	33	500 ft. spool
10	Solid	3	.20	45	500 ft. coil
10	7	3	.21	48	500 ft. coil
10	19	3	.21	48	500 ft. coil
8	Solid	4	.25	72	500 ft. coil
8	7	4	.27	77	500 ft. coil
8	19	4	.27	77	500 ft. coil
<b>600 Volt Extra Heavy Insulation</b>					
14	Solid	4	.19	27	500 ft. spool
14	7	4	.20	29	500 ft. spool
14	19	4	.20	29	500 ft. spool
12	Solid	4	.21	37	500 ft. spool
12	7	4	.22	39	500 ft. spool
12	19	4	.22	39	500 ft. spool
10	Solid	4	.23	51	500 ft. coil
10	7	4	.24	53	500 ft. coil
10	19	4	.24	53	500 ft. coil
8	Solid	5	.28	80	500 ft. coil
8	7	5	.29	83	500 ft. coil
8	19	5	.29	83	500 ft. coil
6	7	5	.35	113	500 ft. coil
6	19	5	.36	113	500 ft. coil
4	7	5	.39	168	500 ft. coil
4	19	5	.40	168	500 ft. coil
2	7	5	.45	267	500 ft. coil
2	19	5	.46	267	500 ft. coil

## FLEXIBLE CORDS

### Type S and SO Cord — 600 Volts



Habirshaw Types S and SO cords are used as portable power supply cords for small electric tools and machinery. They are listed by the National Electrical Code as suitable for pendant or portable application in damp places for extra hard usage. They are available in sizes #18AWG to #10AWG and are rated at 600 volts.

Types S and SO are similar in construction, viz., flexible stranded copper conductors, separator, rubber insulation, fillers and a jacket overall. The jacket for Type S is Buna-S synthetic rubber while the jacket for Type SO is neoprene for oil resistance.

Size AWG No.	Two-Conductor		Three-Conductor		Four-Conductor	
	Approx. O.D. (Inches)	Approx. Ship. Wt. Lb. per 1000 (Feet)	Approx. O.D. (Inches)	Approx. Ship. Wt. Lb. per 1000 (Feet)	Approx. O.D. (Inches)	Approx. Ship. Wt. Lb. per 1000 (Feet)
18	.390	80	.405	93	.435	121
16	.405	93	.430	111	.485	136
14	.530	152	.560	182	.605	229
12	.605	202	.635	245	.665	288
10	.640	246	.690	308	.745	378

Standard package—250' coil. 18-2, 18-3, 18-4, 16-2, 16-3 packed 2 coils per carton. All other sizes single coils.

### Type SJ and SJO Cord — 300 Volts



Habirshaw Types SJ and SJO are available in sizes #18AWG and #16AWG. Rated at 300 volts and employing thinner jackets

they resemble Types S and SO. For drop lights, lamps, and small tools. Specify whether for stationary or constant service.

Size AWG No.	Two-Conductor		Three-Conductor		Four-Conductor	
	Approx. O.D. (Inches)	Approx. Ship. Wt. Lb. per 1000'	Approx. O.D. (Inches)	Approx. Ship. Wt. Lb. per 1000'	Approx. O.D. (Inches)	Approx. Ship. Wt. Lb. per 1000'
18	.305	53	.335	66	.360	78
16	.330	63	.360	82	.390	95

Standard package—250' coil. 18-2, 18-3 packed 4 coils per carton. All others 2 coils per carton.

### Type SP Cord — 300 Volts (Formerly POSJ)



Habirshaw Type SP is an all rubber two-conductor parallel rip type cord rated at 300 volts. It is generally used for wiring

lamps and other small devices. SP is available in two sizes, namely #18AWG and #16AWG.

Size AWG & No. of Conductors	Stranding	Approx. O.D. (Inches)	Approx. Net Wt. Lb. per 1000'	Standard Package
18-2 SP-1	41/34	.120 x .225	28	8-250' Spools
18-2 SP-2	41/34	.153 x .290	33	4-250' Spools
16-2 SP-2	65/34	.165 x .315	43	2-250' Spools

### Type C Lamp Cord — 300 Volts



Uncoated copper conductors, flexible stranding, separator, rubber insulation, soft cotton braid, conductors twisted. Furnished

in green and yellow braid.

Size AWG & No. of Conductors	Stranding	Insulation Thickness (Inches)	Approx. O.D. (Inches)	Approx. Net Wt. Lb. per 1000'	Standard Package
18-2	16/30	2/64	.300	30	4-250' Spools
16-2	26/30	2/64	.325	35	4-250' Spools
14-2	41/30	3/64	.420	60	2-250' Spools



# *Technical Data*

**HABIRSHAW • PROVEN BY THE TEST OF TIME**





## Shipping Reels for Insulated Cable

### DESIGNATION AND STANDARD DIMENSIONS

Reel Desig.	24-12-10	30-12-12	36-16-18	42-24-24	48-24-24	54-32-32	60-32-32	66-40-36	72-48-36	78-48-36	84-56-36	84-56-48
Flange Dia. (In.)	24	30	36	42	48	54	60	66	72	78	84	84
Drum Dia. (In.)	12	12	16	24	24	32	32	40	48	48	56	56
Traverse (In.)	10	12	18	24	24	32	32	36	36	36	36	48

### RECOMMENDED MAXIMUM CAPACITY IN FEET

<i>Cable O.D. (Inches)</i>												
.20	4700											
.25	3100	6600										
.30	2140	4250										
.35	1450	3490										
.40	1190	2530										
.45	950	1790										
.50		1370	2210	4055								
.60		1070	1970	3175	3530							
.70		800	1570	2436	3055	5200						
.80		580	1258	1720	2852	4230						
.90			875	1340	2345	3437	4305					
1.00			805	1194	1870	2707	3873	4700	4860			
1.10			608	914	1518	2223	2929	3875	3960			
1.20			474	707	1267	1778	2766	3230	3260	4245		
1.30			449	640	971	1376	2266	2535	2513	3835		
1.40			331	609	929	1270	1811	2100	2040	3286		
1.50			308	440	726	1225	1752	1945	1881	2640	2995	3990
1.60				414	686	943	1426	1559	1810	2548	2465	3327
1.70				387	510	848	1288	1500	1406	2087	2365	3113
1.80				277	510	848	1076	1437	1344	2000	1890	2520
1.90				257	483	623	1023	1102	1280	1587	1800	2330
2.00				236	445	587	968	1048	1215	1509	1710	2245
2.10				236	340	550	724	992	886	1429	1305	1742
2.20				216	310	550	724	716	833	1082	1228	1667
2.30				135	310	367	684	716	833	1082	1228	1591
2.40				135	310	367	523	675	785	1022	894	1237
2.50						342	484	629	523	951	827	1175
2.60						342	484	629	523	734	827	1113
2.70						315	449	453	523	734	827	1113
2.80						197	449	420	487	682	775	1056
2.90						178	288	420	487	682	560	712
3.00						178	288	385	448	629	510	712

## EXCERPTS FROM NATIONAL ELECTRICAL CODE, 1951 EDITION

**Table 1 — Allowable Current-Carrying Capacities  
of Insulated Conductors in Amperes**

Not More Than Three Conductors in Raceway or Cable  
(Based on Room Temperature of 30 C., 86 F.)

Size AWG MCM	Paper						Size AWG MCM
	Rubber Type R Type RW	Thermoplastic Asbestos Type TA		Asbestos Var-Cam Type AVA Type AVL	Impregnated Asbestos Type AI (14-8) Type AIA	Asbestos Type A (14-8) Type AA	
		Var-Cam Type V					
		Thermoplastic Type T Type TW	Rubber Type RH				
14	15	15	25	30	30	30	14
12	20	20	30	35	40	40	12
10	30	30	40	45	50	55	10
8	40	45	50	60	65	70	8
6	55	65	70	80	85	95	6
4	70	85	90	105	115	120	4
3	80	100	105	120	130	145	3
2	95	115	120	135	145	165	2
1	110	130	140	160	170	190	1
0	125	150	155	190	200	225	0
00	145	175	185	215	230	250	00
000	165	200	210	245	265	285	000
0000	195	230	235	275	310	340	0000
250	215	255	270	315	335	...	250
300	240	285	300	345	380	...	300
350	260	310	325	390	420	...	350
400	280	335	360	420	450	...	400
500	320	380	405	470	500	...	500
600	355	420	455	525	545	...	600
700	385	460	490	560	600	...	700
750	400	475	500	580	620	...	750
800	410	490	515	600	640	...	800
900	435	520	555	...	...	...	900
1,000	455	545	585	680	730	...	1,000
1,250	495	590	645	...	...	...	1,250
1,500	520	625	700	785	...	...	1,500
1,750	545	650	735	...	...	...	1,750
2,000	560	665	775	840	...	...	2,000

Correction Factor for Room Temperatures Over 30 C., 86 F.

deg C. F.								deg C. F.	
40	104	.82	.88	.90	.94	.95	...	40	104
45	113	.71	.82	.85	.90	.92	...	45	113
50	122	.58	.75	.80	.87	.89	...	50	122
55	131	.41	.67	.74	.83	.86	...	55	131
60	140	...	.58	.67	.79	.83	.91	60	140
70	158	...	.35	.52	.71	.76	.87	70	158
75	167	...	...	.43	.66	.72	.86	75	167
80	176	...	...	.30	.61	.69	.84	80	176
90	194	...	...	...	.50	.61	.80	90	194
100	212	...	...	...	...	.51	.77	100	212
120	248	...	...	...	...	...	.69	120	248
140	284	...	...	...	...	...	.59	140	284

See notes, following table 2.



**Table 2 — Allowable Current-Carrying Capacities  
of Insulated Conductors in Amperes**

Single Conductor in Free Air  
(Based on Room Temperature of 30 C., 86 F.)

Size AWG MCM			Thermoplastic Asbestos Type TA						Size AWG MCM
	Rubber Type R Type RW		Var-Cam Type V	Asbestos Var-Cam Type AVA Type AVL	Impregnated Asbestos Type AI (14-8) Type AIA	Asbestos Type A (14-8) Type AA	Slow-Burning Type SB		
								Thermoplastic Type T Type TW	
14	20	20	30	40	40	45	30	14	
12	25	25	40	50	50	55	40	12	
10	40	40	55	65	70	75	55	10	
8	55	65	70	85	90	100	70	8	
6	80	95	100	120	125	135	100	6	
4	105	125	135	160	170	180	130	4	
3	120	145	155	180	195	210	150	3	
2	140	170	180	210	225	240	175	2	
1	165	195	210	245	265	280	205	1	
0	195	230	245	285	305	325	235	0	
00	225	265	285	330	355	370	275	00	
000	260	310	330	385	410	430	320	000	
0000	300	360	385	445	475	510	370	0000	
250	340	405	425	495	530	...	410	250	
300	375	445	480	555	590	...	460	300	
350	420	505	530	610	655	...	510	350	
400	455	545	575	665	710	...	555	400	
500	515	620	660	765	815	...	630	500	
600	575	690	740	855	910	...	710	600	
700	630	755	815	940	1005	...	780	700	
750	655	785	845	980	1045	...	810	750	
800	680	815	880	1020	1085	...	845	800	
900	730	870	940	....	....	...	905	900	
1000	780	935	1000	1165	1240	...	965	1000	
1250	890	1065	1130	....	....	...	....	1250	
1500	980	1175	1260	1450	....	...	1215	1500	
1750	1070	1280	1370	....	....	...	....	1750	
2000	1155	1385	1470	1715	....	...	1405	2000	

Correction Factor for Room Temperatures Over 30 C., 86 F.

deg C. F.								deg C. F.	
40 104	.82	.88	.90	.94	.95	...	...	40 104	
45 113	.71	.82	.85	.90	.92	...	...	45 113	
50 122	.58	.75	.80	.87	.89	...	...	50 122	
55 131	.41	.67	.74	.83	.86	...	...	55 131	
60 140	....	.58	.67	.79	.83	.91	....	60 140	
70 158	....	.35	.52	.71	.76	.87	....	70 158	
75 167	....	....	.43	.66	.72	.86	....	75 167	
80 176	....	....	.30	.61	.69	.84	....	80 176	
90 194	....	....	....	.50	.61	.80	....	90 194	
100 212	....	....	....	....	.51	.77	....	100 212	
120 248	....	....	....	....	....	.69	....	120 248	
140 284	....	....	....	....	....	.59	....	140 284	

Excerpts from National Electrical Code, 1951 Edition.  
See notes, following this table.

## Notes to Tables 1 and 2

1. **Bare Conductors.** If bare conductors are used with insulated conductors, their allowable current-carrying capacity shall be limited to that permitted for the insulated conductor with which they are used.

2. **Application of Table.** For open wiring on insulators and for concealed knob-and-tube work, the allowable current-carrying capacities of Table 2 shall be used. For all other recognized wiring methods, the allowable current-carrying capacities of Table 1 shall be used, unless otherwise provided in this code.

3. **More Than Three Conductors in a Raceway.** Table 1 gives the allowable current-carrying capacity for not more than three conductors in a raceway or cable. If the number of conductors in a raceway or cable is from 4 to 6, the allowable current-carrying capacity of each conductor shall be reduced to 80 per cent of the values in Table 1. If the number of conductors in a raceway or cable is from 7 to 9, the allowable current-carrying capacity of each conductor shall be reduced to 70 per cent of the values in Table 1.

Exceptions to the foregoing are specified in sections 3624, 3745, and 7265 of the 1951 National Electrical Code.

4. **Neutral Conductor.** A neutral conductor which carries only the unbalanced current from other conductors, as in the case of normally balanced circuits of three or more conductors, shall not be counted in determining current-carrying capacities as provided for in the preceding paragraph.

In a 3-wire circuit consisting of two phase wires and the neutral of a 4-wire, 3-phase system, a common conductor carries approximately the same current as the other conductors and is not therefore considered as a neutral conductor.

5. **Ultimate Insulation Temperature.** In no case shall conductors be associated together in such a way with respect to the kind of circuit, the wiring method employed, or the number of conductors, that the limiting temperature of the conductors will be exceeded.

6. **Use of Conductors With Higher Operating Temperatures.** If the room temperature is within 10 degrees C of the maximum allowable operating temperature of the insulation, it is desirable to use an insulation with a higher maximum allowable operating temperature; although insulation can be used in a room temperature approaching its maximum allowable operating temperature limit if the current is reduced in accordance with the table of correction factors for different room temperatures.

7. **Voltage Drop.** The allowable current-carrying capacities in Tables 1 and 2 are based on temperature alone and do not take voltage drop into consideration.

8. **Overcurrent Protection.** If the standard ratings and settings of overcurrent devices do not correspond with the ratings and settings allowed for conductors, the next higher standard rating and setting may be used, but not exceeding 150 per cent of the allowable carrying capacity of the conductor.

**Table 3—Allowable Current-Carrying Capacity of Flexible Cord and Fixture Wire in Amperes†**

(Based on Room Temperature of 30 C., 86 F. See Section 4008 and Table 31 of Chapter 10).

Size AWG	Flexible Cord			Fixture Wire		
	Rubber Types PO, C, PD, P, PWP, K, E, EO	Rubber Types S, SO, SJ, SJO, SV, POSJ Thermo- plastic Types ST, SJT, SVT, POT	Types HC, HPD, HSJ	Cotton Types CFC* CFPO* CFPD* Asbestos Types AFC* AFPO* AFPD*	Rubber Types RF—64 RF—32 FF—64 FF—32	Thermo- plastic Types TF TFF Cotton Type CF* Asbestos Type AF*
27**	..	..	..	..	..	..
18	5	7	10	6	5	6
17	..	..	12	..	..	..
16	7	10	15	8	7	8
15	..	..	17	..	..	..
14	15	15	20	17	..	17
12	20	20	..	..	..	..
10	25	25	..	..	..	..
8	35	..	..	..	..	..
6	45	..	..	..	..	..
4	60	..	..	..	..	..
2	80	..	..	..	..	..

\*These types are used almost exclusively in fixtures where they are exposed to high temperatures and ampere ratings are assigned accordingly.

\*\*Tinsel cord.

†Table 3 gives the allowable current carrying capacities for not more than three current-carrying conductors in a cord. If the number of current-carrying conductors in a cord is from four to six the allowable current-carrying capacity of each conductor shall be reduced to 80 per cent of the values in the table.

Excerpts from National Electrical Code, 1951 Edition.



**Table 4—Number of Conductors in Conduit or Tubing**

Rubber Covered, Types RF-32, R, RH, and RW — Thermoplastic, Types TF, T and TW  
One to Nine Conductors

For more than nine conductors see Table 9. (See sections 3013, 3466 and 3486)

Size AWG MCM	Number of Conductors in One Conduit or Tubing								
	1	2	3	4	5	6	7	8	9
18	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4
16	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4
14	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1
12	1/2	1/2	1/2	3/4	3/4	1	1	1	1 1/4
10	1/2	3/4	3/4	3/4	1	1	1	1 1/4	1 1/4
8	1/2	3/4	3/4	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2
6	1/2	1	1	1 1/4	1 1/2	1 1/2	2	2	2
4	1/2	1 1/4	*1 1/4	1 1/2	1 1/2	2	2	2	2 1/2
3	3/4	1 1/4	1 1/4	1 1/2	2	2	2	2 1/2	2 1/2
2	3/4	1 1/4	1 1/4	2	2	2	2 1/2	2 1/2	2 1/2
1	3/4	1 1/2	1 1/2	2	2 1/2	2 1/2	2 1/2	3	3
0	1	1 1/2	2	2	2 1/2	2 1/2	3	3	3
00	1	2	2	2 1/2	2 1/2	3	3	3	3 1/2
000	1	2	2	2 1/2	3	3	3	3 1/2	3 1/2
0000	1 1/4	2	2 1/2	3	3	3	3 1/2	3 1/2	4
250	1 1/4	2 1/2	2 1/2	3	3	3 1/2	4	4	4 1/2
300	1 1/4	2 1/2	2 1/2	3	3 1/2	4	4	4 1/2	4 1/2
350	1 1/4	3	3	3 1/2	3 1/2	4	4 1/2	4 1/2	5
400	1 1/2	3	3	3 1/2	4	4	4 1/2	5	5
500	1 1/2	3	3	3 1/2	4	4 1/2	5	5	6
600	2	3 1/2	3 1/2	4	4 1/2	5	6	6	6
700	2	3 1/2	3 1/2	4 1/2	5	5	6	6	...
750	2	3 1/2	3 1/2	4 1/2	5	6	6	6	...
800	2	3 1/2	4	4 1/2	5	6	6	...	...
900	2	4	4	5	6	6	6	...	...
1000	2	4	4	5	6	6	...	...	...
1250	2 1/2	4 1/2	4 1/2	6	6	...	...	...	...
1500	3	5	5	6	...	...	...	...	...
1750	3	5	6	6	...	...	...	...	...
2000	3	6	6	...	...	...	...	...	...

\*Where a service run of conduit or electrical metallic tubing does not exceed 50 feet in length and does not contain more than the equivalent of two quarter bends

Excerpts from National Electrical Code, 1951 Edition.

from end to end two No. 4 insulated and one No. 4 bare conductors may be installed in 1-inch conduit or tubing. See Note 3 to Tables 1 and 2.

**Table 5—Number of Conductors in Conduit or Tubing****Lead-Covered Types RL and RHL—600 V. (See sections 3466 and 3486)**

Size AWG MCM	Number of Conductors in One Conduit or Tubing											
	Single Conductor Cable				2-Conductor Cable				3-Conductor Cable			
	1	2	3	4	1	2	3	4	1	2	3	4
14	1/2	3/4	3/4	1	3/4	1	1	1 1/4	3/4	1 1/4	1 1/2	1 1/2
12	1/2	3/4	3/4	1	3/4	1	1 1/4	1 1/4	1	1 1/4	1 1/2	2
10	1/2	3/4	1	1	3/4	1 1/4	1 1/4	1 1/2	1	1 1/2	2	2
8	1/2	1	1 1/4	1 1/2	1	1 1/4	1 1/2	2	1	2	2	2 1/2
6	3/4	1 1/4	1 1/2	1 1/2	1 1/4	1 1/2	2	2 1/2	1 1/4	2 1/2	3	3
4	3/4	1 1/4	1 1/2	1 1/2	1 1/4	2	2 1/2	2 1/2	1 1/2	3	3	3 1/2
3	3/4	1 1/4	1 1/2	2	1 1/4	2	2 1/2	3	1 1/2	3	3	3 1/2
2	1	1 1/4	1 1/2	2	1 1/4	2	2 1/2	3	1 1/2	3	3 1/2	4
1	1	1 1/2	2	2	1 1/2	2 1/2	3	3 1/2	2	3 1/2	4	4 1/2
0	1	2	2	2 1/2	2	2 1/2	3	3 1/2	2	4	4 1/2	5
00	1	2	2	2 1/2	2	3	3 1/2	4	2 1/2	4	4 1/2	5
000	1 1/4	2	2 1/2	2 1/2	2	3	3 1/2	4	2 1/2	4 1/2	4 1/2	6
0000	1 1/4	2 1/2	2 1/2	3	2 1/2	3	3 1/2	4 1/2	3	5	6	6
250	1 1/4	2 1/2	3	3	...	...	...	...	3	6	6	...
300	1 1/2	3	3	3 1/2	...	...	...	...	3 1/2	6	6	...
350	1 1/2	3	3	3 1/2	...	...	...	...	3 1/2	6	6	...
400	1 1/2	3	3	3 1/2	...	...	...	...	3 1/2	6	6	...
500	1 1/2	3	3 1/2	4	...	...	...	...	4	6	...	...
600	2	3 1/2	4	4 1/2	...	...	...	...	...	...	...	...
700	2	4	4	5	...	...	...	...	...	...	...	...
750	2	4	4	5	...	...	...	...	...	...	...	...
800	2	4	4 1/2	5	...	...	...	...	...	...	...	...
900	2 1/2	4	4 1/2	5	...	...	...	...	...	...	...	...
1000	2 1/2	4 1/2	4 1/2	6	...	...	...	...	...	...	...	...
1250	3	5	5	6	...	...	...	...	...	...	...	...
1500	3	5	6	6	...	...	...	...	...	...	...	...
1750	3	6	6	...	...	...	...	...	...	...	...	...
2000	3 1/2	6	6	...	...	...	...	...	...	...	...	...

The above sizes apply to straight runs or with nominal offsets equivalent to not more than two quarter-bends.  
See section 3470 for bends in conduit.

Excerpts from National Electrical Code, 1951 Edition.



**Table 9—Number of Conductors in Conduit or Tubing**

**More Than Nine Conductors**  
**Rubber-Covered Types RF-32, R, RH, and RW**  
**Thermoplastic Types TF, T, and TW**

\*When Specially Permitted by N.E. Code (See section 3012)

Size AWG	Maximum Number of Conductors in Conduit or Tubing						
	$\frac{3}{4}$ Inch	1 Inch	1 $\frac{1}{4}$ Inch	1 $\frac{1}{2}$ Inch	2 Inch	2 $\frac{1}{2}$ Inch	3 Inch
18	12	20	35	49	80	115	176
16	10	17	30	41	68	97	150
14	..	10	18	25	40	59	90
12	..	..	15	21	35	50	77
10	..	..	13	17	29	41	64
8	..	..	..	10	17	25	38
6	..	..	..	..	..	15	23

\* More than nine conductors are permitted in a single conduit for conductors between a motor and its controller; stage pocket and border circuits, section 5212; sign flashers, section 6021-d; elevator control conductors, section 6214.

**Table 11—Combination of Conductors**

(See sections 3466 and 3486)

For groups or combinations of conductors not included in the Tables 4 to 9, it is recommended that the conduit or tubing be of such size that the sum of the cross-sectional areas of the individual conductors will not be more than the percentage of the interior cross-sectional area of the conduit or tubing shown in the following table:

**Per Cent Area of Conduit or Tubing**

	Number of Conductors				
	1	2	3	4	Over 4
Conductors (not lead covered) .....	53	31	43	40	40
Lead-covered conductors .....	55	30	40	38	35
For rewiring existing raceways for increased load where it is impracticable to increase the size of the raceway due to structural conditions .....	60	40	50	50	50

See Note to Table 13 for size of conduit or tubing for combinations of conductors not shown in Table 4.

For carrying capacity of more than three conductors in a conduit or tubing, see Tables 1 and 2, Note 3.

See Tables 12 to 19 for dimensions of conductors, conduit and tubing.

Excerpts from National Electrical Code, 1951 Edition.

**Tables 12 to 17.** Tables 12 to 17 give the nominal size of conductors and conduit or tubing recommended for use in computing size of conduit or tubing for various combinations of conductors. The

dimensions represent average conditions only, and while variations will be found in dimensions of conductors and conduits of different manufacture, these variations will not affect the computation.

**Table 12—Dimensions and Per Cent Area of Conduit and Tubing**

**Areas of Conduit or Tubing for the Combinations of Wires Permitted in Table 11.**

Area—Square Inches											
Trade Size	Internal Diameter Inches	Total 100 %	Not Lead Covered				Lead Covered				
			1 Cond. 53 %	2 Cond. 31 %	3 Cond. 43 %	4 Cond. and Over 40 %	1 Cond. 55 %	2 Cond. 30 %	3 Cond. 40 %	4 Cond. 38 %	Over 4 Cond. 35 %
1/2	.622	.30	.16	.09	.13	.12	.17	.09	.12	.11	.11
3/4	.824	.53	.28	.16	.23	.21	.29	.16	.21	.20	.19
1	1.049	.86	.46	.27	.37	.34	.47	.26	.34	.33	.30
1 1/4	1.380	1.50	.80	.47	.65	.60	.83	.45	.60	.57	.53
1 1/2	1.610	2.04	1.08	.63	.88	.82	1.12	.61	.82	.78	.71
2	2.067	3.36	1.78	1.04	1.44	1.34	1.85	1.01	1.34	1.28	1.18
2 1/2	2.469	4.79	2.54	1.48	2.06	1.92	2.63	1.44	1.92	1.82	1.68
3	3.068	7.38	3.91	2.29	3.17	2.95	4.06	2.21	2.95	2.80	2.58
3 1/2	3.548	9.90	5.25	3.07	4.26	3.96	5.44	2.97	3.96	3.76	3.47
4	4.026	12.72	6.74	3.94	5.47	5.09	7.00	3.82	5.09	4.83	4.45
4 1/2	4.506	15.95	8.45	4.94	6.86	6.38	8.77	4.78	6.38	6.06	5.57
5	5.047	20.00	10.60	6.20	8.60	8.00	11.00	6.00	8.00	7.60	7.00
6	6.065	28.89	15.31	8.96	12.42	11.56	15.89	8.67	11.56	10.98	10.11

Excerpts from National Electrical Code, 1951 Edition.



**Table 13—Dimensions of Rubber-Covered and Thermoplastic-Covered Conductors**

Size AWG MCM	Types RF-32, R, RH, RW		Types TF, T, TW	
	Approx. Diam. Inches	Approx. Area Sq. Ins.	Approx. Diam. Inches	Approx. Area Sq. Ins.
18	.146	.0167	.106	.0088
16	.158	.0196	.118	.0109
14	2/64 ins. .171	.0230	.131	.0135
14	3/64 ins. .204*	.0327*	...	...
12	2/64 ins. .188	.0278	.148	.0172
12	3/64 ins. .221*	.0384*	...	...
10	.242	.0460	.168	.0224
8	.311	.0760	.228	.0408
6	.397	.1238	.323	.0819
4	.452	.1605	.372	.1087
3	.481	.1817	.401	.1263
2	.513	.2067	.433	.1473
1	.588	.2715	.508	.2027
0	.629	.3107	.549	.2367
00	.675	.3578	.595	.2781
000	.727	.4151	.647	.3288
0000	.785	.4830	.705	.3904
250	.868	.5917	.788	.4877
300	.933	.6837	.843	.5581
350	.985	.7620	.895	.6291
400	1.032	.8365	.942	.6969
500	1.119	.9834	1.029	.8316
600	1.233	1.1940	1.143	1.0261
700	1.304	1.3355	1.214	1.1575
750	1.339	1.4082	1.249	1.2252
800	1.372	1.4784	1.282	1.2908
900	1.435	1.6173	1.345	1.4208
1000	1.494	1.7531	1.404	1.5482
1250	1.676	2.2062	1.577	1.9532
1500	1.801	2.5475	1.702	2.2748
1750	1.916	2.8895	1.817	2.5930
2000	2.021	3.2079	1.922	2.9013

\*The dimensions of Type RW wire. Also, these dimensions to be used for new work in computing

size of conduit or tubing for combinations of wires not shown in Table 4.

Excerpts from National Electrical Code, 1951 Edition.

**Table 16—Dimensions of Lead-Covered Conductors****Types RL and RHL**

Size AWG MCM	Single Conductor		Two Conductor		Three Conductor	
	Diam. Inches	Area Sq. Ins.	Diam. Inches	Area Sq. Ins.	Diam. Inches	Area Sq. Ins.
14	.28	.062	.28 x .47	.115	.59	.273
12	.29	.066	.31 x .54	.146	.62	.301
10	.35	.096	.35 x .59	.180	.68	.363
8	.41	.132	.41 x .71	.225	.82	.528
6	.49	.188	.49 x .86	.369	.97	.738
4	.55	.237	.54 x .96	.457	1.08	.916
2	.60	.283	.61 x 1.08	.578	1.21	1.146
1	.67	.352	.70 x 1.23	.756	1.38	1.49
0	.71	.396	.74 x 1.32	.859	1.47	1.70
00	.76	.454	.79 x 1.41	.980	1.57	1.94
000	.81	.515	.84 x 1.52	1.123	1.69	2.24
0000	.87	.593	.90 x 1.64	1.302	1.85	2.68
250	.98	.754	.....	.....	2.02	3.20
300	1.04	.85	.....	.....	2.15	3.62
350	1.10	.95	.....	.....	2.26	4.02
400	1.14	1.02	.....	.....	2.40	4.52
500	1.23	1.18	.....	.....	2.59	5.28

NOTE: No. 14 to No. 8, solid conductors; No. 6 and larger, stranded conductors. Data for 2/64-inch insulation not yet completed.

Excerpts from National Electrical Code, 1951 Edition.



**Table 17—Dimensions of Asbestos-Varnished-Cambric Insulated Conductors**

**Types AVA, AVB, and AVL**

Size AWG MCM	Type AVA		Type AVB		Type AVL	
	Approx. Diam. Inches	Approx. Area Sq. In.	Approx. Diam. Inches	Approx. Area Sq. In.	Approx. Diam. Inches	Approx. Area Sq. In.
14	.245	.047	.205	.033	.320	.080
12	.265	.055	.225	.040	.340	.091
10	.285	.064	.245	.047	.360	.102
8	.310	.075	.270	.057	.390	.119
6	.395	.122	.345	.094	.430	.145
4	.445	.155	.395	.123	.480	.181
2	.505	.200	.460	.166	.570	.255
1	.585	.268	.540	.229	.620	.300
0	.625	.307	.580	.264	.660	.341
00	.670	.353	.625	.307	.705	.390
000	.720	.406	.675	.358	.755	.447
0000	.780	.478	.735	.425	.815	.521
250	.885	.616	.855	.572	.955	.715
300	.940	.692	.910	.649	1.010	.800
350	.995	.778	.965	.731	1.060	.885
400	1.040	.850	1.010	.800	1.105	.960
500	1.125	.995	1.095	.945	1.190	1.118
550	1.165	1.065	1.135	1.01	1.265	1.26
600	1.205	1.140	1.175	1.09	1.305	1.34
650	1.240	1.21	1.210	1.15	1.340	1.41
700	1.275	1.28	1.245	1.22	1.375	1.49
750	1.310	1.35	1.280	1.29	1.410	1.57
800	1.345	1.42	1.315	1.36	1.440	1.63
850	1.375	1.49	1.345	1.43	1.470	1.70
900	1.405	1.55	1.375	1.49	1.505	1.78
950	1.435	1.62	1.405	1.55	1.535	1.85
1,000	1.465	1.69	1.435	1.62	1.565	1.93

NOTE: No. 14 to No. 8, solid, No. 6 and larger, stranded; except AVL where all sizes are stranded.

### **Varnished-Cambric Insulated Conductors**

#### **Type V**

The insulation thickness for varnished-cambric conductors, Type V, is the same as for rubber-covered conductors, Type R, except for Nos. 14 and 12 which have 3/64-inch insulation for varnished-cambric and 2/64-inch insulation for rubber-covered conductors and

for No. 8 which has 3/64-inch insulation for varnished-cambric, and 4/64-inch insulation for rubber-covered conductors. See table in section 93101. Tables 4 and 5 may, therefore, be used for the number of varnished-cambric insulated conductors in a conduit or tubing.

Excerpts from National Electrical Code, 1951 Edition.

**Table 18—Properties of Copper Conductors**

Size AWG	Area Cir. Mils	Concentric Lay Stranded Conductors		Bare Conductors		D. C. Resistance Ohms/M Ft. At 25 C. 77 F.	
		No. Wires	Diam. Each Wire Inches	Diam. Inches	*Area Sq. Inches	Bare Cond.	Tinned Cond.
18	1624	Solid	.0403	.0403	.0013	6.510	6.77
16	2583	Solid	.0508	.0508	.0020	4.094	4.25
14	4107	Solid	.0641	.0641	.0032	2.575	2.68
12	6530	Solid	.0808	.0808	.0051	1.619	1.69
10	10380	Solid	.1019	.1019	.0081	1.018	1.06
8	16510	Solid	.1285	.1285	.0130	.641	.660
6	26250	7	.0612	.184	.027	.410	.426
4	41740	7	.0772	.232	.042	.259	.269
3	52640	7	.0867	.260	.053	.205	.213
2	66370	7	.0974	.292	.067	.162	.169
1	83690	19	.0664	.332	.087	.129	.134
0	105500	19	.0745	.373	.109	.102	.106
00	133100	19	.0837	.418	.137	.0811	.0844
000	167800	19	.0940	.470	.173	.0642	.0668
0000	211600	19	.1055	.528	.219	.0559	.0524
	250000	37	.0822	.575	.260	.0431	.0444
	300000	37	.0900	.630	.312	.0360	.0371
	350000	37	.0973	.681	.364	.0308	.0318
	400000	37	.1040	.728	.416	.0270	.0278
	500000	37	.1162	.814	.520	.0216	.0225
	600000	61	.0992	.893	.626	.0180	.0185
	700000	61	.1071	.964	.730	.0154	.0159
	750000	61	.1109	.998	.782	.0144	.0148
	800000	61	.1145	1.031	.835	.0135	.0139
	900000	61	.1215	1.093	.938	.0120	.0124
	1000000	61	.1280	1.152	1.042	.0108	.0111
	1250000	91	.1172	1.289	1.305	.00864	.00890
	1500000	91	.1284	1.412	1.566	.00719	.00740
	1750000	127	.1174	1.526	1.829	.00617	.00636
	2000000	127	.1255	1.631	2.089	.00539	.00555

\* Area given is that of a circle having a diameter equal to the overall diameter of a stranded conductor.

The values given in the table are those given in Circular 31 of the National Bureau of Standards except that those shown in the last column are those given in Specification B33 of the American Society for Testing Materials.

The resistance values given in the last two columns are applicable only to direct current. When conductors larger than No. 4/0 are used with alternating current the following multiplying factors should be used to compensate for skin effect.

**Table 18-a—Multiplying Factors for Converting D.C. Resistance to A.C. Resistance**

Size C M	Multiplying Factor		Size C M	Multiplying Factor		Size C M	Multiplying Factor	
	25 Cycles	60 Cycles		25 Cycles	60 Cycles		25 Cycles	60 Cycles
250000	.....	1.005	600000	1.005	1.025	1000000	1.012	1.067
300000	.....	1.006	700000	1.006	1.034	1250000	1.019	1.102
350000	.....	1.009	750000	1.007	1.039	1500000	1.027	1.142
400000	.....	1.011	800000	1.008	1.044	1750000	1.037	1.185
500000	.....	1.018	900000	1.010	1.055	2000000	1.048	1.233

Excerpts from National Electrical Code, 1951 Edition.



**Table 19—Dimensions of Conduit or Tubing**

Size	Internal Diameter Inches	Area Square Inches	Size	Internal Diameter Inches	Area Square Inches
1/2	.622	.30	3	3.068	7.38
3/4	.824	.53	3 1/2	3.548	9.90
1	1.049	.86	4	4.026	12.72
1 1/4	1.380	1.50	4 1/2	4.506	15.95
1 1/2	1.610	2.04	5	5.047	20.00
2	2.067	3.36	6	6.065	28.89
2 1/2	2.469	4.79			

Excerpts from National Electrical Code, 1951 Edition.

### Voltage Drop

In the table below are given approximate values which may be used in checking voltage drop for the most commonly used types of circuits. Values are given for the various types of insulation ordinarily used on *copper* conductors.

The maximum permissible length of run of a given circuit which may be used with a given current for a voltage drop of one volt is determined as follows:

$$\frac{\text{Maximum permissible length in feet}}{\text{for 1 volt drop}} = \frac{\text{Factor from table}}{\text{Operating current in amperes}}$$

The drop in volts which will be obtained per foot of run of a given circuit carrying a certain current shall be determined as follows:

$$\text{Volts drop per foot} = \frac{\text{Operating current in amperes}}{\text{Factor from table}}$$

Care must be taken to select the appropriate factor based on single or three phase operation.

### Factors for Determining Voltage Drop, Conductor Size, Length, and Current for Single and Three-Phase Circuits in Magnetic Conduit

Based on 80% Lagging Power Factor

Size, AWG or MCM	Single Phase Circuits	Three Phase Circuits
14	195	225
12	310	360
10	490	565
8	770	900
6	1,200	1,400
4	1,850	2,100
2	2,800	3,200
1	3,400	4,000
0	3,800	4,400
00	4,500	5,200
000	5,300	6,100
0000	6,300	7,200
250	6,800	7,800
300	7,500	8,700
350	8,200	9,500
400	8,700	10,000
500	9,700	11,200
600	10,400	12,000
700	11,000	12,700
750	11,200	13,000
1,000	12,000	14,000

## Approximate Weights of Bare Copper Wire and Cable

For Use in Estimating Copper Requirements under the CMP.

All Weights Given in Pounds per Thousand Feet.

Size AWG or MCM		Single Conductor	Two Conductor	Three Conductor
Solid	20	3	6	9
	19	4	8	12
	18	5	10	16
	17	6	12	19
	16	8	16	25
	14	12	24	38
	12	20	40	62
	10	31	62	95
	8	50	100	153
	6	80	160	245
	4	126	252	385
Stranded	20	3	6	10
	19	4	8	12
	18	5	10	16
	17	6	12	19
	16	8	16	25
	14	13	26	41
	19/25	19	38	58
	12	20	40	62
	10	32	64	100
	19/22	38	76	115
	8	51	102	157
	6	81	162	249
	4	129	258	397
	2	205	410	631
	1	259	518	794
	1/0	326	652	1,002
	2/0	411	822	1,264
	3/0	519	1,038	1,594
	4/0	654	1,308	2,010
	250	773	1,546	2,375
	300	927	1,854	2,850
	350	1,082	2,164	3,325
	400	1,236	2,472	3,800
	450	1,391	2,782	4,275
	500	1,545	3,090	4,750
	600	1,854	3,708	5,700
	700	2,164	4,328	6,650
	750	2,318	4,636	7,125
	800	2,472		7,600
	1,000	3,090		9,500
	1,250	3,863		
	1,500	4,635		
	1,750	5,408		
	2,000	6,180		

Weights of cables with 4 or more conductors may be estimated proportionally from three conductor weights.

e.g. 4/C No. 12 strand weighs  $(4/3)(62.) =$  approximately 83 lbs./1000 ft.



# ***PHELPS DODGE COPPER PRODUCTS*** **CORPORATION**

## **WIRES AND CABLES FOR THE ELECTRICAL CONSTRUCTION INDUSTRY**

### **RUBBER INSULATED**

N.E. Code Grade—Type R	Aerial Cable
Heat and Moisture Resistant Grades— Types RH, RW, and RH-RW	Service Entrance Cable
Fixture Wire	Service Drop Cable
PD-X Nonmetallic-Sheathed Cable	Underground Service Entrance Cable
High Tension	Neoprene-Sheathed Cable—Type RR
Neoprene-Sheathed	Twisted Portable Cords—Types S, SJ, SO, SJO
Leaded	Parallel Cord—Type SP
Duct Cable	Lamp Cord—Type C
Welding Electrode Cable	Welding Power Supply Cable
Motor Lead Wire	Control Cable

### **THERMOPLASTIC INSULATED**

Small Diameter Building Wire—Type TW	Oil Burner Ignition Wire
PD-X Nonmetallic-Sheathed Cable	Neon Sign Wire
Control Cable	Fixture Wire
Habirdure Machine Tool Wire	

### **VARNISHED CAMBRIC INSULATED**

BRAIDED TYPES

LEADED TYPES

### **STYROFLEX COAXIAL CABLE**

### **BARE WIRES AND CABLES**

### **WEATHER-RESISTANT WIRES AND CABLES**

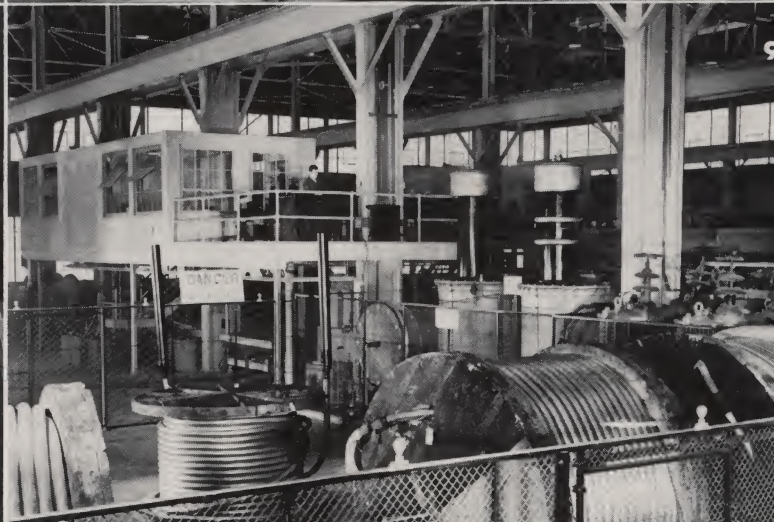
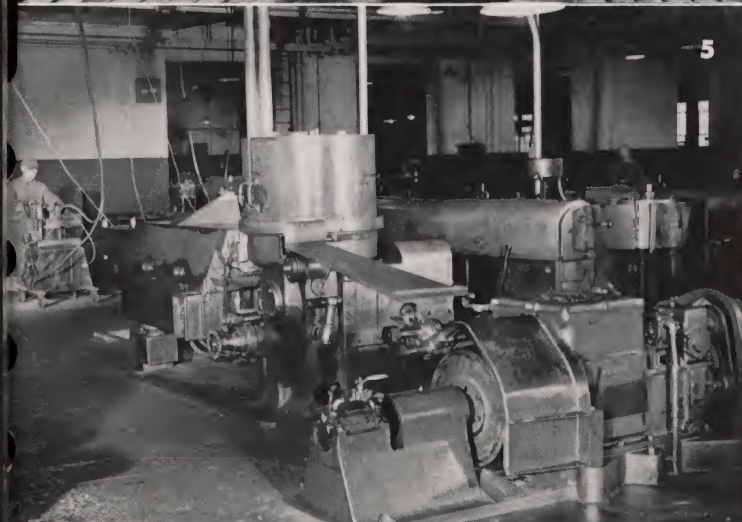
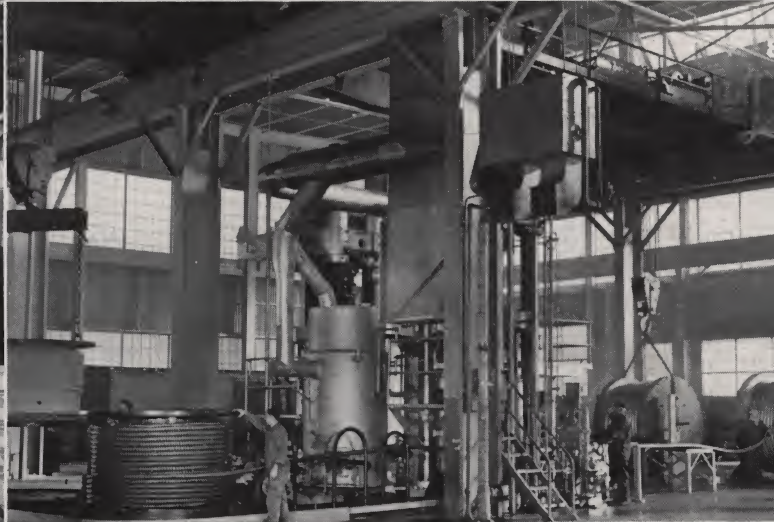
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BRAIDED TYPE	

### **PAPER INSULATED CABLES**

Belted	Shielded	Armored	Leaded	Submarine
Oil Filled Cable		Compression Cable	Gas Filled Cable	

















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